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Agriculture.

PISÉ BUILDINGS FOR FARMERS.

Some three years ago we published an article on the building of houses, the walls of which, instead of being constructed of bricks, stone, or wood, are composed of the soil alone. The "Daily Mail" (1st October, 1920) drew attention to this form of house-building. The estimated cost of building timber at the present time renders the building of houses on the farm so expensive that it constitutes a heavy tax on the new selector. The following description of the "Pisé" building, as given in the issue of this Journal in January, 1917, deserves the consideration of new settlers on the land. The "Daily Mail" says that forty ex-army officers are building houses of compressed earth at Hornchurch, Essex, and the experiment is proving a great success. No substance whatever except normally moist earth is used, but the result is a sound, weather-proof structure. Why, then, incur an outlay of from £300 to £600 for a farm house which can be built out of the soil?

"Having taken up a selection either for farming or grazing, the settler in the old days of the 'colony' of Queensland, forty or fifty years ago, either rigged up a tent for his first home, or, if in a locality where there was plenty of splitting timber or tea-tree, he rose to the dignity of a humpy of low log walls roofed with tea-tree bark, or stripped some sheets of stringy bark and built a bark hut; later on, perhaps, he split slabs and shingles, and dwelt in a fairly comfortable house. In the primeval scrub or forest, this question of housing himself, and perhaps his family, was easily solved. But it was otherwise when the farm happened to be situated on the plains. Then it meant either continuous tent life, or, as the alternative, a galvanised iron or a sawn timber structure, both very expensive in the pre-railway days. Yet, all the time on the treeless plain, all the materials were at hand for the construction of a comfortable weather-proof house, warm in winter, cool in summer, which could be erected by the farmer himself, the only tools needed being a pick, shovel, and rammer, and half a dozen planks.

"The material for the construction of the walls, chimney, and flooring was the soil itself. All that the settler need do is to dig out the soil and shovel it into rough wooden moulds, ramming it down solid in layers of 4 or 6 in. When the mould or box is full and well rammed, it is taken to pieces and erected on another portion of the building, and the work proceeds until the walls and partitions are completed. Any inexperienced man can thus construct a comfortable dwelling, as the actual pisé work presents so little difficulty that it can be done by anyone who has sufficient strength to shovel earth and wield a rammer, and is careful to see that the moulds or

boxes into which the soil is shovelled are kept plumb and in straight lines. The services of a carpenter, unless the settler has some knowledge of that trade, will be found necessary to make doors and window-frames and construct the roof, and see that these are set correctly and in their proper places.

"The whole process is well described in the 'Agricultural Gazette of New South Wales' by Mr. G. L. Sutton, Cowra Experimental Farm, 2nd May, 1907.

"In some of the South American States there are numbers of such buildings constructed either of rammed soil or of adobé or sun-dried bricks (for which material like clay can be used), which is unsuitable for pisé work. For the latter, almost any soil containing a fair amount of loam is suitable; but a pipeclay loam, with which gravel is intermixed, is best. Soil which cakes after a heavy rain, or which, if ploughed or dug when dry, turns up in hard clods, is very suitable. Any vegetation growing on the surface of the earth selected must be removed, as also should any roots, bits of stick, or vegetable matter likely to decay. The earth is best used as it is dug, and, if too dry, should be brought to the correct moist condition by watering it about two days before it is to be used. The earth should be just moist enough to be crumbly, and yet adhesive enough to retain the impression of the fingers when pressed in the hand.

"We have culled the above preliminary notes on pisé building from Mr. Sutton's exhaustive description in the abovenamed 'Gazette.' It is stated that pisé buildings are much cooler than buildings constructed with solid brick walls. Some idea may be formed of the durability of pisé by the fact that there is at present, at North Logan, a stable built of pisé which has been in constant use for over sixty years, and which is to-day in good order, notwithstanding the fact that the external walls are unprotected from the weather. Pisé buildings are said to have a life of 150 years.

"It is, however, advisable to protect the walls from moisture, especially from rain, which should be guarded against by surrounding the building with verandas or by overhanging eaves. Pisé buildings not so protected are, however, very common."

FARMYARD MANURE: ITS MAKING AND USE.*

Not many years ago it used to be the custom for certain representatives of agricultural science to extol the virtues of artificial manures, while farmers, on the other hand, stoutly maintained the superiority of farmyard manure. In recent years the position has changed. It is now the scientific worker who emphasises the importance of farmyard manure and the need for making and storing it properly. Farmyard manure and artificial fertilisers do not compete with one another; they serve quite different purposes in the soil. No farmer can do without artificials, no matter how much farmyard manure he may have at his disposal, and, conversely, no arable farmer, except in a few special districts, would like to do without farmyard manure, even if he could have unlimited supplies of artificials at very low prices. The best results are always obtained on arable land by proper combinations of farmyard and artificial manures, although on grazing land farmyard manure may not act well.

So far as is at present known, the effects produced by farmyard manure in the soil are three:—

1. To supply nitrogen and potash to the plant.
2. To improve the physical condition of the soil, and thus increase its capacity for going into a good tilth and for holding water. The effect of this is to steady the yield.
3. To assist some of the micro-organisms of the soil; among other effects, to benefit the clover crop.

Only in the first of these is there any competition with artificial fertilisers, and even here the competition is restricted, because artificials usually exert their full action on the crop to which they are applied, while farmyard manure does not.

THE CONSTITUENTS OF FARMYARD MANURE.

1. *The Excretions.*—The animal excretions constitute an important part of the fertilising material of farmyard manure. The urine is by far the most important—

* Reprint in the "Journal of the Ministry of Agriculture and Fisheries," London, August, 1920 (abridged), of a paper read by Dr. E. J. Russell, F.R.S., Director of Rothamsted Experimental Station, at a meeting of the Farmers' Club, 31st May, 1920.

it is the chief source of the immediately beneficial part of the dung. The amount and value of the urine depend on the food and on the animal; urine contains the fertilising constituents of all the digested food which has neither been retained in the animal nor secreted in the milk.

Its composition can be calculated, and this is done in determining the manurial value of foods, but the calculation never comes out quite right, because its valuable constituents are so easily decomposable that they are readily lost.

Although the dry matter of the urine forms only about 2 per cent. of the actual weight of the dung, it constitutes a much larger proportion of the weight of fertilising materials. A ton of dung contains about 12 to 15 lb. of nitrogen, of which about 4 to 9 lb., according to the amount of cake and corn fed, would come from the urine.

2. *The Litter.*—Straw is by far the commonest litter, and it forms the chief part, by weight, of farmyard manure. Broadly speaking, 1 ton of straw makes 4 tons of farmyard manure, but the additional 3 tons is very largely water, only a small part being other excretory substances. Of 100 parts of farmyard manure made in a bullock yard, 75 are water, about 2 are solid constituents of the liquid excretions, about 8 are constituents of the solid excretions, and about 15 are constituents of the litter. On the basis of bulk, therefore, litter is more important than anything else, although not in other respects. Its chief effect is that it forms the humus in the soil, and therefore helps to promote tilth and to improve the water-holding capacity. Unfortunately, its change into humus is expensive to the farmer in that the organisms effecting the change take up valuable nitrogen compounds from the urine that ought to have gone to feed the crop.

THE MAKING OF FARMYARD MANURE.

The simplest case is that of manure made from fatting bullocks in stalls or covered yards where the manure is of considerable value, and where pains are commonly taken to preserve it. Of every 100 lb. of nitrogen fed to the animals, about 95 lb. pass into the manure—often about 45 to 60 lb. in the liquid and 50 lb. to 35 lb. in the solid excretions. The 45-60 lb. are in a form highly valuable to the plant. The decomposition process, however, takes rather a heavy toll, in one way or another about 15 lb., leaving 30 to 45 lb. in a form really useful to the plant. The nitrogen in the solid, and such of this 15 lb. as is not altogether lost, may at some time become useful to the plant, but it does not count for much; only the 35 to 40 lb. balance can be relied upon to yield any profit.

When, as often happens, the manure is made in open yards, the loss becomes more serious. The minimum loss of 15 per cent. is exceeded, often much exceeded, and, as always, it falls on the most valuable part of the nitrogen. It is probably not far wrong to suppose that the manure from a bullock receiving 3 lb. of cake and upwards per day is worth 15s. or more per month when made in a covered yard, but not more than some 10s. or 12s. per month when made in an open yard. For a herd of twenty bullocks, the loss in manurial value through having no roof to the yard may be any amount up to £5 per month.

It is often maintained, however, that some rain is necessary, as otherwise the manure becomes too dry. While a certain amount of moistness is necessary, rain may seriously damage the manure by washing out some of its valuable constituents and by bringing about certain undesirable changes. It is probably better to keep rain away from the manure and to ensure sufficient moisture by reducing the area over which the animals can wander, thus obtaining a high proportion of excretions among the litter. The comfort and well-being of the animals, however, must always be the first consideration. Practically pumping liquid manure or water over the heap is not to be recommended.

STORAGE OF FARMYARD MANURE.

In the matter of storage, the Northern farmer has some advantages over his colleagues in the South, one of which is that he can, as a rule, advantageously apply farmyard manure to his land in the spring. Manure made in the yards during winter can thus be hauled straight on to the land and ploughed in with reasonable certainty that this is the best thing to do. The Southern farmer, on the other hand, while he may be driven to spring applications of farmyard manure, would often obtain better results by applying the manure in the autumn. The storage of farmyard manure over the summer months thus becomes an important question.

However carefully matters are arranged, directly the manure is drawn from the yards some of its really useful nitrogen—the 30-lb. balance—begins to leak away.

It forms part of the odour that gave the old farmers so much satisfaction.* It enters largely into the black liquid, which, even in a well-conducted farm, is often seen draining away from the manure heap. Both smell and liquid are signs of leakage; but they do not represent the whole of the loss. It is wrong to suppose that matters can be put right by simply replacing the black liquid; its very existence is a symptom that bigger losses are taking place.

Many attempts have been made to obtain a reliable estimate of the amount thus lost. In experiments at Rothamsted the losses varied from 7 per cent. to 35 per cent. of the total nitrogen. A common loss was about 20 per cent., falling chiefly on the urine nitrogen. Assuming this latter figure were generally true—and we have no reason for supposing otherwise—our 30 lb. of valuable nitrogen would soon be reduced to little more than 10 lb.—*i.e.*, 35 per cent. of the original nitrogen, or 75 per cent. of the most valuable portion, has disappeared.

LOSS IN FARMYARD MANURE.

It has often been suggested that kainit, gypsum, superphosphate, or other substance added to the manure helps to reduce the loss by fixing ammonia. The processes bringing about the loss, however, are too complex to offer any reasonable expectation of the discovery of a satisfactory fixer.

It is difficult to form any estimate of the loss which occurs to farmyard manure over the whole country, but it must be considerable. Taking the present consumption of straw in the farm buildings of the United Kingdom to be about 10,000,000 tons per annum, the production of farmyard manure would be 40,000,000 tons, worth at present prices some £25,000,000 or more. The loss in making and storing the manure heaps is not less, but probably more, than 20 per cent. of this, *i.e.*, more than £5,000,000 each year.

This loss cannot altogether be avoided, because it is part of the cost of the necessary decomposition of the straw, but it can be much reduced. In experiments at Rothamsted the provision of shelter to keep off some of the rain much increased the effectiveness of the heap.

Shelter can be provided in several ways. A layer of earth has proved effective, but it is not always convenient. Straw-thatched hurdles acted well in the trials. Placing the heap in a well-sheltered position is also helpful.

At present prices it is probably safe to suppose that an amount from 1s. to 5s. is added to the value of every ton of manure by providing shelter.

THE FEEDING OF CAKE.

There has been considerable discussion as to the extent to which cake-feeding adds to the value of farmyard manure. In recent experiments the additional value due to the cake was less than was expected, and the benefit of the cake was shown only in the first year, and not afterwards. The practical man, however, holds fast to cake-fed dung, and recent experiments at Rothamsted have shown a direction in which it may be superior to ordinary dung. The breaking up of the litter to form humus is brought about by organisms which require the sort of nitrogen compounds that they would find in cake-fed dung; they would, therefore, be able to work more vigorously in cake-fed dung than in ordinary dung, and hence would tend to produce better soil conditions.

The evidence indicates that cake feeding produces less benefit than might be expected on soils where plant food only is needed, but more benefit on soils where additional humus is necessary.

COW MANURE.

The question of cow manure is complicated by the necessity for satisfying sanitary inspectors, and by the fact that it is of poorer quality than bullock manure.

The poverty of cow manure arises from the fact that a cow secretes a considerable proportion of the nitrogen of the digested food in the milk instead of passing all of it into the urine like a bullock. The urine is, therefore, weaker than in the case of bullocks, and there is a corresponding reduction in the value of the manure.

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* At a meeting of the old East Moreton Farmers' Association, held at Oxley Creek many years ago, a lengthy discussion took place on the subject of Artificial and Farmyard Manures. The members who hailed from the farming districts of the old country held the opinion that farmyard manure was to be preferred to artificial, and one of them stated that when he had a manure with a "jolly good stink in it he knew it was all right."—Editor "Q.A.J."

On some of the Oxfordshire farms a big covered shed is built next the cattle-shed for the storage of manure. The principle is sound, but the plan is sometimes inconvenient in execution. In Cheshire one sees good dungsteads—roofs of corrugated iron carried on stout posts, and so placed that the dung can easily be tipped underneath and then compacted. These are of great value, but care must be taken that the manure is sufficiently well compacted to prevent it becoming too dry.

Cow manure, however, presents an interesting possibility, because so much of the liquid is or can be collected separately, and this should certainly be done wherever practicable. The liquid is very valuable, containing as a rule about 18 lb. to 23 lb. of nitrogen per 1,000 gallons, besides possessing a high potash value.

A suitable dressing is 1,500 gallons per acre, and it serves excellently for seeds and as a spring application for winter oats or winter wheat. On an average each cow contributes about 1¼ gallons of urine per day, *which is worth about 2s. 6d. per month. The difficulty at present is to apply this material.

ARTIFICIAL FARMYARD MANURE.

As the bulk of farmyard manure is litter, and the valuable part of the residue is largely made up of liquid excretions, it is not difficult for the scientific investigator to make an artificial farmyard manure from straw and artificial fertilisers. This has been done at Rothamsted, and 1 or 2 tons of the product were tried on the field. It is too early yet to say whether the material will work out economically in practice, but the principle is sound; it consists in allowing the straw to decompose with formation of humus, and supplying the necessary nitrogen compound in the form of an ammonium salt. When the details are worked out the method may probably prove of interest in districts like the Rothings, in Essex, where quantities of straw are produced but no live stock is kept, and yet where farmyard manure ought to be used.

POSSIBILITIES OF IMPROVEMENT.

The possibilities of improving bullock manure lie in the following directions:—

1. To make it in a covered yard, having sufficient beasts to keep the manure moist.
2. To put it into the ground as soon as possible after the beasts are removed; but, if this is impossible, to make a tight clamp and provide some shelter by a layer of earth or by some other device.
3. To avoid washing by rain or exposure to weather.

The defects of the clamp, even when compacted and sheltered, are recognised, and science has not yet said the last word as to the storage of manure; but for the present it is the only practicable method.

The improvement of manure from cowsheds can be effected:—

1. By collecting the liquid separately in a cement tank.
2. By storing the solid in a covered dungstead, to which can also be added manure from the horses. It is necessary to compact the heap. Provision must also be made for a tank to collect drainage.

The application of the liquid to the land, however, is a difficult problem. The method of distributing the liquid over the farm by means of pipes has been tried, but has resulted in financial loss. Something can be done by delivery from carts, but the most helpful line is the use of absorbents, which is now being investigated at Rothamsted. This is an important problem, and it will grow in importance if the soiling system of keeping dairy cows develops in this country.

THE CANADIAN PROVINCE OF ALBERTA.

Seldom do we hear any news about the agricultural position of this fine district of Canada, which extends from the northern frontier of the United States of America as far as the 60th parallel of north latitude, and between the Rocky Mountains of British Columbia, Saskatchewan, and Assiniboia. A very interesting account of the agricultural industry in this well-watered, fertile tract was lately published in the

* Both at Woking and at Garforth, however, Collins gives 5 gallons containing 4 lb. of dry matter as the figure for the north.

"Annales de Gembloux," a very informative journal, of Belgium. The article is entitled—

A Few Remarks about Agriculture in Alberta (Canada).

By CHARLES FORCKEL, A.I.Gx., Okotoks, Alberta.

"Alberta is a Canadian Province spreading from the frontier of the United States of America as far as the 60th parallel, and between the Rocky Mountains and Saskatchewan. It has a population of 500,000 to 600,000. Its climate, depending on the latitude, varies with the regions. In general, winter is hard (60 F.). The favourable season (March-June to August-October) is short and frosty. Consequently, early species are utilised for cultivation.

"Among the cultivated varieties are the following:—*Wheat:* le Marquis (largely spread), Red Fife, Prélude, Kitchener, Rubis; *Oats:* Banner, Abundance, Garton No. 22, Seger or Victory, Leader (great yield); *Barley:* Gartons No. 68, Mandchouri, Mensury, Malster, O.H.C. 21.

"The climate requires farm work to be carried on quickly, which necessitates a large working-stock and the use of machines and tractors driven by a staff few in number.

"Four main regions characterise the country:

"I. *Southern Alberta.*—Light, sandy, chocolate-brown soil, mostly suitable for wheat, which is the principal culture. The ground does not hold the water, and the drought causes heavy losses. Certain companies (Canadian Pacific Railway) are irrigating or will irrigate with profit. The cultivation of wheat is done by tractors. Very little attention is given to cattle and horse-breeding and dairy-farming.

"II. *Central Alberta.*—Heavier soil, blacker and richer, giving extraordinary crops during rather wet years. Owing to the early frost, wheat is cultivated on a smaller scale, and the crops are more varied: Oats, barley, pasture-land. For the latter, natural grazing land, *Bromus inermis* (excellent), Timothy, and also winter barleys are utilised. Draught and plough horses breeding (Clyde, Percheron, Shire, Suffolk Punch, and Belgian horse). Production of butcher's meat (Hereford more resistant than Shorthorn). In the environs of Calgary there are a few milk herds. The dual-purpose variety is utilised for milk and meat. Since the war, sheep have been introduced with much success. Pig-rearing has been given up on account of the present economic conditions.

Yields per acre are estimated as follows:

	Grain.	Straw.
Spring wheat	25 to 30 bushels	1 to 1.5 tons
Spring wheat on fallow (summer fallow)	30 to 45 bushels	1.5 to 2.5 tons
Autumn wheat on fallow	40 to 45 bushels	—
Spring or autumn oats	45 to 60 bushels	1 to 1.5 tons
Oats on summer fallow	75 to 125 bushels	2 to 2.5 tons
Spring barley (6 rows)	20 to 35 bushels	1
Barley on fallow	35 to 70 bushels	1.5 to 2 tons
Fodder (depending on wetness of the year)	—	—
Flax	12 bushels	—

"Fallowing is largely done in order to conserve the water for more abundant crops, and also to get rid of weeds. The latter, especially the *Thlaspi arvense* (French weed) and the *Avena fatua*, are dreaded. These spread on account of the exclusive cereal cultivation. The majority of farms have an area of a half-section. (A section is 320 acres.) The buildings are made of wood and sometimes leave a lot to be desired.

"III. *North Alberta.*—Clayish soil, often swampy in certain regions (Peace River). Summer period shortened and humid. Wheat is not cultivated. Oats do not always come to maturity. Early barley gives crops. Farms of quarter-section predominate; horse, pig, and sheep-rearing; dairy farms are more frequent than in other regions. The population is mixed and few Canadians and Americans are to be found. On the Peace River side, wheat has been successfully cultivated, but could not be exported on account of the lack of railways.

"IV. *Foothills.*—Hilly and wooded region (pines, poplars, willows) at the foot of the Rocky Mountains. Owing to frost, oats do not ripen and are utilised as fodder.

This region is an ideal rearing place for horned cattle. Grass is abundant. Light-horse breeding has disappeared from these regions since the development of the motor car. Draught and plough horse breeding (Percherons).

"The price of farms is increasing more and more. Good land, which was worth 15 to 18 dollars a few years ago, is now worth 35 to 50. The emigrants who want to settle on their own must have a rather important capital; they must be experienced in agriculture, armed with patience, and not be afraid of working. For the use of machines and tractors, they must also be skilled in mechanics and electricity.

"Culture is extensive; one man per 100 acres. A farm of 1,500 acres has only four or five men in normal times. No improvements (draining or levelling) are being done at present. According to the Government statistics, a farmer and his family must dispose of half-section (320 acres) to enjoy a decent living.

"The situation of farmers is made uneasy by the difficulty in obtaining loans at a reasonable rate. Banks giving normally a 3 per cent. interest, lend to farmers at 8 per cent. and 10 per cent., and on short time. Mortgage societies lend at 7 to 9 per cent. on long time. Many farms are mortgaged; the farmer gives an instalment when he enters and hypothecates the remainder.

"Another disadvantage is due to the cost of railway transport and to the great distance of markets. However, thanks to the fertility of the soil, to rearing, and to the energy of the farmers, cultivation is developing successfully. Agriculture in Alberta is at present in its childhood, but there are great possibilities for the future. Great improvements will be necessary in the farm, in the way of cultivating and in the utilisation and sale of products. Such modifications can only be performed by work and time.

COTTON PROSPECTS.

The cotton crop of 1919-20 was the smallest for the past three seasons, due mainly to the persistent drought, which so seriously affected the germination of the seed that the area from which the crop was gathered amounted to barely 100 acres. In 1917 the area planted was 133 acres, which was increased in 1918 to 203 acres. The yield of clean lint from the 100 acres amounted to approximately 12,000 lb., for the purchase of which tenders were called in September last by the Department of Agriculture and Stock.

Now, how does this work out in the light of a payable crop as compared with other farm crops?

The preparation of the land for annual farm crops by ploughing and harrowing is much the same in the case of maize, potatoes, sugarcane, wheat, and other cereals as for a cotton crop, and in most cases the crops have to be kept free from weeds during their growth. There remain then the harvesting expenses. Maize, on attaining maturity, has to be pulled, husked, threshed and winnowed, and bagged. A potato crop must be dug or ploughed out, or possibly machine dug, after which some 4 to 8 tons per acre have to be picked up by hand, sorted, and bagged; sugar-cane calls for trashing, cutting, topping, and milling; wheat, again, is cut, bound, stooked, stacked, threshed and winnowed; arrowroot is dug, washed, pulped, dried, and bagged; coffee entails pruning, strading, picking, pulping, milling to remove parchment and silver-skin, roasting, grinding, &c. Other crops are more or less costly to prepare for market. Cotton demands less expense in this direction. Putting aside the preparation of the land, sowing the seed, and subsequent scuffling of weeds, common to all farm crops, this crop entails only one operation as far as the farmer is concerned. That operation is picking. This is all that has to be done (except carting or railway freight) to place the cotton on the market in the shape of "seed cotton." With the subsequent "ginning," for separating the lint from the seed, the grower is not concerned. The seed cotton as picked from the bush is in marketable form.

An average crop of seed cotton we will set down at 1,000 lb. per acre, and good pickers can take off from 100 to 200 lb. per day. Even young people can gather from 60 to 100 lb. per day. The average of 1,000 lb. per acre has frequently been exceeded; in many cases, during the early days of cotton-growing in Queensland, crops of seed cotton were picked for a yield of from 1,500 to 2,000 lb.

If oil mills were established anywhere in the cotton districts or in the neighbourhood of Brisbane, the seed from the gin houses would have a high market value, which would materially increase the value of the cotton crop, as, in addition to the price of the lint, there would be an extra profit of about £8 per ton on seed purchased for the oil mill.

To sum up: Which of the crops enumerated is the most payable, especially in a dry season? Results have shown that the cotton-grower, even with a minimum crop of 1,000 lb. per acre, can obtain 4d. per lb., which is equal to £25 per acre, less few expenses. And there is yet a further value of this crop, in that the cotton bush is an excellent fodder for stock, for which purpose it can be utilised when the last picking has been done.

In some respects the raising of cotton plants is easier than is the case with other field crops in a dry season, provided that rain occurs after sowing time, for once the young plants have sprung up and have made good growth up to 1 ft. or so, they are practically drought-proof. Furthermore, if the plants have been kept clean of weeds during their early growth, they will need little further attention from that period to maturity.

Last season's sowing, being carried on as late as January, 1920, resulted in much of the areas furnishing but a half or quarter crop. Many farmers planted late, having in view an early 1921 harvest. This practice has much to commend it, as in the event of a dry spring preventing early planting, the growers having ratoon shrubs will thereby be sure of a crop of early-maturing cotton. As every month's growth increases the annual yield, it follows that a germination in September or October will result in a much heavier crop than will cotton grown in subsequent months. It must be held in mind that sowing as late as January is not advised in the colder regions, but in the Central and North this method is justified.

COTTON SITUATION—FACTORS THAT COUNT.

MORE PRODUCTION NEEDED.

It is reported from London that the movement for increasing the supply of cotton has made further progress, and the Empire Cotton-Growing Committee has published its organisation scheme for countries in which the work has not yet been largely developed. The educational part is expected to cost £27,000, and the whole scheme £200,000 a year, the greater part of which, it is anticipated, will be supplied by the trade.

Sir Charles W. Macara, of Manchester, the great authority on cotton, in referring to the fluctuations which have taken place recently in the prices of raw material, writes to "The Financial Times" that while he firmly believes in the absolute indispensability of the legitimate middlemen who handle the cotton crop of the world, he is entirely against those who make the raw material of an international industry a counter for gambling operations. It is that, he says, that is mainly responsible for the want of confidence and the existing lack of stability.

The fall on the American Cotton Exchanges is followed immediately by an almost unprecedented rise and another fall. The figures that appear in the Press of these fluctuations are misleading to those who are not conversant with the methods of the trade. The prices of the finer qualities of cotton, required by England more than by any other country, have been going up when the official prices recorded in the Press have been going down, and it is not unusual for futures to be declining while actual cotton has been rapidly going up.

THE DOMINANT FACTORS.

Sir Charles states that the dominant factors in the present situation are as follow:—

(1) From various causes there is still a large amount of the cotton machinery of the world idle.

(2) Production has been considerably curtailed by the reduction of the working hours in England from 55½ to 48 hours a week, and this process has been going on throughout the world during the past twelve years or more.

(3) The machinery available, it is obvious, dominates the situation as regards the supply of the manufactured goods, and a fall in the raw material would not alter the present situation, especially as raw material bought now would require six, nine, twelve months, or even longer, before it could pass through the numerous processes necessary.

(4) It is possible, as recent experience has proved, for any fall in the cost of the raw material to be counteracted by increases in wages and by the ever-growing cost of everything that enters into the manufacture of cotton goods.

(5) An enormous reduction has taken place during the war period in the output of cotton fabrics, which play a preponderating part in clothing the people of the world.

(6) The textile machinists, who were very largely employed on munitions, have an almost impossible task in making up the leeway of the war period, both in regard to renewals and in regard to the normal extension of textile machinery which obtained in the year before the war.

WORLD'S CONSUMPTION.

The world is now consuming, according to a statistical publication just issued by the National City Bank of New York, 21,000,000 bales of cotton a year, of which the United States produces, on a five-year average, 11,500,000 bales, or just half the total consumption. This year's American crop is likely to be 12,000,000 bales; but that any market increase above 12,000,000 is possible in the future is considered improbable by American cotton experts, who declare that the limit of America's cotton-producing capacity has been nearly reached. Considerable areas still exist which might be devoted to cotton, but the growing tendency of southern planters to diversify crops will encroach on cotton lands.

The growth of the world demand, which, statisticians estimate, will amount to 30,000,000 bales inside of ten years, will require, therefore, greatly increased cotton production in other countries than America, and probably in countries not now great producers, as Egypt and India are also believed to have approached their maximum. For this reason Mesopotamia is being watched with the greatest interest by cotton people, who foresee a great future for that country under British direction. Australia is also regarded by American cotton manufacturers as a probable future source of raw cotton.

The National City Bank's statistical tables show that of the 6,483 cotton mills of the world 2,009 are in Great Britain and 1,451 in the United States, the two countries having more than half of all the mills in the world, and consuming 10,000,000 bales of cotton a year, or about half of all the cotton the world produces. Adding Indian and Canadian mills to Great Britain's total brings it to 2,322 mills, with a consumption of 6,109,141 bales, somewhat above the total consumption of the American mills (6,065,686 bales). The only other countries engaged largely in cotton manufacturing are France, with 430 mills and a pre-war consumption of a little over 1,000,000 bales; Italy, with 480 mills and a normal consumption of 850,000 bales; Japan, and China.

Japanese mills, according to the latest available census, numbered 175, and their consumption in 1915 was 1,500,000 bales; China's 34 mills in 1913 consumed 525,000 bales of cotton. Both these countries are materially increasing their cotton-manufacturing capacities, and China is increasing her local growth of cotton. It will be some years, in all probability, before Germany and Russia again become serious factors in the cotton goods trade.

The inference from the figures and collateral evidence, says the National City Bank, is that the future of the manufacturing cotton industry of the world is in the hands of the Anglo-Saxon peoples, and that the bulk of the world's cotton will be grown in lands under the Union Jack and the Star and Stripes.—"Daily Mail" (Q.).

[From the above, it will be clear that the cultivation of cotton within the Empire must largely expand. Queensland, amongst other portions of the British Empire, is eminently adapted to successful and profitable cotton-production, and from all accounts received from Britain, the United States, Egypt, and India, there appears to be a vast shortage in the supply for the raw material at remunerative prices. We have consistently urged the farmers to plant small areas of cotton, which could be managed by the grower and his family, and, indeed, profitably by hired labour. The opportunity of raising the State to the position of a great cotton-producing country is at our hand, assisted as we are by the action of the Government in establishing a cotton-ginning plant, and guaranteeing a price of 5½d. per lb. for cotton in the seed delivered to the Department of Agriculture to be ginned and marketed, together with a division of profits amongst suppliers after deduction of ginning and market expenses.—Ed. "Q.A.J."]

Pastoral.

BLOWFLY MAGGOTS: IMPORTANT DISCOVERY.

Dr. A. Altson, who is engaged in research work at the Imperial College of Science, under the direction of Dr. Lefroy, professor of entomology, has obtained results which will prove effective in the suppression of the sheep maggot fly. Dr. Alton's success was due to the accidental discovery that blowflies, breeding in the Zoological Gardens, suffered heavily from attacks of three natural enemies, of which two are already known in Australia. The third and the chief is the *Alysia manductor*. This fly ovideposits in blowfly maggots which, as a result, do not produce blowflies, but Alysia.—"Times," London.

Mr. W. G. Brown, Sheep and Wool Expert of the Department of Agriculture and Stock, was engaged last month in experiments which were carried on by the special Blowfly Committee of the Federal Institute of Science and Industry for some past at Dalmally, in the Roma district, and the operations have resulted in considerable success. An inspection of 16,000 sheep experimented on showed that the treatment of these animals against the blowfly pest had been signally successful.

Five experiments, varying in the degree of the strength of the poison used, were carried out. The most satisfactory experiment was that in which the most poisonous mixture was used. It consisted of one packet of poisonous dip and 4 lb. of arsenic dissolved with soda in 120 gallons of water. This mixture was jetted into the breach of the sheep with a power pump at a pressure of 120 lb., and had given the sheep immunity for nearly three months, carrying them over the worst period—that of lambing. A report on the experiments will be submitted to the Blowfly Committee at a subsequent meeting.

Mr. Brown stated that the country in the Roma district was looking beautiful, and that the season was the best since 1903. The stock was in very good condition, excepting for the blowfly pest, which was very bad.

PLANTATION FUTURES.

A friend in the Far East advises the editor of "India Rubber World" that within five years the rubber plantations in India, Ceylon, and the Malay States will be run by Soviets. This change of ownership will come about through a union of the Russians under Lenin, and the Hindoos and Mohammedans of India, who will throw off the "British Yoke." This would mean $10 rubber and a greatly lessened production. It would also be "Red Rubber" in the worst sense of the term.

If memory does not play us false the same source predicted the destruction of Malaysian plantations by disease before 1918. The disease came, but the planters promptly stamped it out. So, too, will the red disease be stamped out in the Far Eastern possessions.

Nevertheless, not that we believe there is any such danger in sight, America as the biggest user of crude rubber should look far ahead for its supplies. The Philippines for planting are ideal once the Filipino will allow it to be done as the rest of the world does it. Then, too, there are our own rubber producers, guayule and *Chrysothamnus*. Of the latter, Luther Burbank, the great plant wizard, in a letter to one of our staff, says that there is not a shadow of a doubt that by analysis of the different individual plants from different localities the rubber content of some will be found to be double that of others, and by starting with these high rubber content plants, and growing from these, any good plant breeder could originate a plant in a reasonably short period that would produce twice as much as the average wild ones do. He says this is a very moderate estimate, as it would not be surprising that a plant should be constructed which would produce ten times the results of the wild ones. Of course, vigour is one of the things to be considered, and possibly compactness of growth, and other matters which would come up during the work of improvement.

A 7 per cent. content has already been found. Double this would be 14 per cent., and ten times as much would be a bonanza. Anyhow, 14 or 70, it's worth working for. —"Planters' Chronicle."

Dairying.

FEEDING PIGS ON DRIED BLOOD.

Referring to the article on "Some Feeding Experiments with Dried Blood," by L. F. Newman, School of Agriculture, Cambridge, published in the September (1920) issue of the Q.A. Journal, a correspondent writes from Beerwah as follows:—

"A neighbour had two pigs which were not thriving, so I bought the worst of them for experimental feeding. To begin with, I gave it two handfuls per day of dried blood mixed with its food, with the object of imparting energy. A few days later I added the same quantity of linseed meal to loosen the skin, and take the stiffness out of it. The pig experimented on was over twelve months old, and, of course, the bone was there. I am now sorry that I did not weigh the animal before making the experiment. It would probably have had a weight of about 56 lb. In five weeks of the feeding described, its weight was 114 lb. and was graded first-class at the factory."

TAKING WATER OUT OF FRUIT.

"Food is the primal need of the world to-day. Next to love, it is the most important thing in life," said Lieutenant R. G. Booth, who returned to Brisbane last October from California. During the past twelve months he has been an A.I.F. repatriation student of the newest American agricultural methods. He left Queensland in June, 1915, as a member of the 4th Light Horse Brigade, under command of Brigadier-General (then Colonel) Spencer Browne. In 1916 he sailed from Egypt for Europe and joined the Australian Flying Corps. In August last year he went to America with ninety-six other Australians to study agriculture. Captain Albert Laver, of Springsure, was one of the party. Lieutenant Booth is the guest of Mr. A. J. Thynne, M.L.C., while in Brisbane.

Chatting with a representative of "The Daily Mail," he said: "My reason for wanting to go to America was this: I noticed in the Strand one day some miserable-looking banana figs on sale. The salesman told me that he handled so many tons of them every week, and I conceived the idea of drying them so that they would retain their colour, shape, and natural flavours. I tried to get to Germany, where they have made great progress in dehydration, which means the removal of surplus water from foodstuffs without destruction of the cellular tissues or impairment of the energy values. In Germany they had 1,900 separate plants, but I was not permitted to go there. Instead, I obtained consent to visit America, which has a special dehydration department attached to its Department of Agriculture, and everything possible is done to foster the industry.

REMOVING WATER.

"The industry consists mainly of removing the moisture from fruits and vegetables by means of carefully regulated currents of air, in which the temperature and humidity are both properly controlled, being passed over the food either with or without previous treatment. This results in the food product gradually losing water without giving up its colour, flavour, or having its cellular structure impaired. A properly dehydrated product will keep, as far as is known, for an indefinite time, and will, when placed in water, swell to its normal size and appearance. When cooked it will have essentially the flavour, odour, and appearance of freshly cooked material made from the fresh product.

"At one of the leading San Francisco hotels a party of prominent people were told that some of the vegetables to be served at dinner would be dehydrated and others fresh. They were requested to write down at the time they ate them which they thought were fresh and which were dehydrated. The results proved that no difference could be detected."

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1920.

The laying for the month was very good. The weather conditions were excellent. There was abundance of green feed, the result being that all the birds are in good fettle. Mr. J. E. Smith was unfortunate enough to lose two birds during the month, the cause of death in both cases being ovarian disorder. Two single birds laid the possible for the month, one owned by L. G. Innes ("D") and the other by E. F. Dennis ("E"). Several laid 28 eggs in the 30 days, and quite a number 27. The highest score for six birds in the light section was 159 eggs, laid by Mr. Manson's pen. This was followed by Mr. N. A. Singer with 158, and Mr. L. G. Innes with 156 eggs. In the heavy section, the pen owned by Mr. Shanks laid 157, with Mr. Cornwall's second with 152 eggs.

The following are the individual scores and the weights of eggs laid by the various competing pens:—

Competitors.	Breed.	Sept.	Total.
	LIGHT BREEDS.		
*G. Trapp	White Leghorns ...	147	754
*Haden Poultry Farm	Do.	148	750
*O. W. J. Whitman	Do.	140	746
Geo. Lawson	Do.	140	740
*J. J. Davies	Do.	140	715
*J. Newton	Do.	145	712
*J. M. Manson	Do.	159	710
*S. McPherson	Do.	125	702
*Quinn's Post Poultry Farm	Do.	144	701
*W. Becker	Do.	134	685
*Dr. E. C. Jennings	Do.	143	679
*W. and G. W. Hindes	Do.	136	672
*T. Fanning	Do.	132	669
*J. H. Jones	Do.	135	668
*H. Fraser	Do.	136	663
*G. Williams	Do.	137	662
*E. A. Smith	Do.	141	651
*L. G. Turner	Do.	156	650
*N. A. Singer	Do.	158	647
S. L. Grenier	Do.	131	640
Thos. Eyre	Do.	137	638
*Mrs. L. F Anderson	Do.	140	634

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Sept.	Total.
LIGHT BREEDS—*continued.*			
Mrs. R. Hodge	White Leghorns ...	149	631
*S. W. Rooney	Do.	136	625
*Range Poultry Farm	Do.	126	617
*B. Chester	Do.	138	613
*Mrs. L. Henderson	Do.	136	600
W. Morrissey	Do.	124	599
*Thos. Taylor	Do.	137	592
Miss E. M. Ellis	Do.	125	583
Avondale Poultry Farm	Do.	130	578
E. Chester	Do.	127	574
A. J. Anderson	Do.	110	566
H. P. Clarke	Do.	130	565
C. Langbecker	Do.	117	554
R. C. J. Turner	Do.	124	553
C. M. Pickering	Do.	112	543
C. H. Towers	Do.	108	525
S. Chapman	Do.	125	516
W. D. Evans	Do.	128	485
H. A. Mason	Do.	134	482
C. A. Goos	Do.	123	489
HEAVY BREEDS.			
*R. Holmes	Black Orpingtons ...	135	777
*D. Fulton	Do.	121	756
*E. F. Dennis	Do.	151	745
*R. Burns	Do.	149	742
*A. Shanks	Do.	157	720
*E. Morris	Do.	145	717
*A. Gaydon	Do.	143	707
H. M. Chaille	Do.	134	707
*A. E. Walters	Do.	128	695
*W. Smith	Do.	138	687
*E. Oakes	Do.	127	651
J. E. Smith	Do.	121	641
*T. Hindley	Do.	117	633
*R. B. Sparrow	Do.	137	612
J. Cornwell	Do.	152	609
G. Muir	Do.	142	606
Parisian Poultry Farm	Do.	128	601
R. C. Cole	Do.	139	588
Mrs. G. H. Kettle...	Do.	131	587
*Nobby Poultry Farm	Do.	114	559
*J. E. Ferguson	Chinese Langshans ...	119	555
*E. Stephenson	Black Orpingtons ...	119	536
G. Flugge	Do.	120	410
Total	...	8,710	41,169

* Indicates that the pen is being single tested.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C	D.	E.	F.	Total.
LIGHT BREEDS.							
G. Trapp	136	119	130	126	130	113	754
Haden Poultry Farm	146	102	141	131	113	117	750
O. W. J. Whitman	116	116	132	120	127	135	746
J. J. Davies	124	118	117	142	113	101	715
J. Newton	141	111	122	85	122	131	712
J. M. Manson	124	120	132	115	100	119	710
S. McPherson	131	120	91	116	134	110	702
Quinn's Post Poultry Farm	131	125	126	116	97	106	701
W. Becker	120	120	126	110	90	119	685
Dr. E. C. Jennings	112	127	100	105	104	131	679
W. and G. W. Hindes	122	113	96	119	101	121	672
T. Fanning	49	122	114	127	128	129	669
J. H. Jones	109	113	118	120	124	84	668
H. Fraser	102	102	120	117	119	103	663
G. Williams	109	112	112	109	125	95	662
E. A. Smith	107	99	121	108	112	104	651
L. G. Innes	65	101	133	112	133	106	650
N. A. Singer	111	98	113	127	102	96	647
Mrs. L. F. Anderson	129	115	122	93	87	88	634
S. W. Rooney	83	83	127	107	107	118	625
Range Poultry Farm	78	107	108	123	95	106	617
B. Chester	106	79	105	113	108	102	613
Mrs. L. Henderson	85	97	107	99	115	97	600
Thos. Taylor	124	107	71	104	90	96	592
HEAVY BREEDS.							
R. Holmes	126	136	125	125	130	135	777
D. Fulton	132	139	118	118	88	161	756
E. F. Dennis	126	106	134	125	116	138	745
R. Burns	119	99	139	114	149	122	742
A. Shanks	102	114	119	139	92	154	720
E. Morris	123	122	129	99	111	133	717
A. Gaydon	114	147	112	97	93	144	707
A. E. Walters	107	119	98	135	103	133	695
W. Smith	87	139	124	130	101	106	687
E. Oakes	103	124	128	59	122	115	651
T. Hindley	106	130	107	130	63	97	633
R. B. Sparrow	114	54	125	110	88	121	612
J. Cornwell	99	136	102	74	87	111	609
Nobby Poultry Farm	105	146	73	147	68	20	552
J. E. Ferguson	53	103	73	95	134	97	555
E. Stephenson	120	86	81	113	72	64	536

CUTHBERT POTTS,
Principal.

WEIGHT OF EGGS, SINGLE HEN PENS.

—	A.	B.	C.	D.	E.	F.	Average.
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
LIGHT BREEDS.							
Mrs. Anderson	1⅞	2	1⅞	2⅛	2⅛	2	2
H. Fraser	1¼	2	2	2	2	2⅛	2⅛
B. Chester	2⅛	2¼	2⅛	2	2	2⅛	2⅛
Quinn's Post	1⅞	2	1⅞	2	2⅛	1⅞	2
T. Fanning	2¼	2⅛	2¼	2⅛	1⅞	1⅞	2⅛
E. A. Smith	1⅞	2⅛	1⅞	1⅞	2⅛	2	2
T. Taylor	2	2⅛	1⅞	2	2	2	2
Range Poultry Farm	2¼	2⅛	2¼	2	1⅞	2⅛	2⅛

WEIGHT OF EGGS, SINGLE HEN PENS—*continued.*

—	A.	B.	C.	D.	E.	F.	Average.
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
LIGHT BREEDS—*continued.*							
S. W. Rooney	2 1/8	2 1/8	1 7/8	2	2	2	2
O. W. Whitman	2	1 7/8	1 7/8	2	1 7/8	1 7/8	1 7/8
S. McPherson	2	1 7/8	2	1 7/8	2	2 1/8	2
J. H. Jones	2 3/8	2 1/8	2	2 1/4	2 1/4	2 1/4	2 1/4
Geo. Trapp	2	2	1 3/4	2	1 7/8	2 1/8	2
L. G. Innes	1 3/4	2	1 3/4	1 7/8	2	2	1 7/8
W. Becker	1 7/8	2 1/8	2	2 1/4	2 1/4	2 1/8	2 1/8
G. Williams	2	2	2	2	1 7/8	2 3/8	2
J. J. Davies	1 3/4	2 1/8	2	1 5/8	1 7/8	2	1 7/8
Dr. Jennings	1 7/8	2	2 1/8	2 1/8	1 7/8	2	2
N. A. Singer	2	2	2	2	2	2	2
Haden Poultry Farm	1 3/4	2 1/8	1 7/8	2	2 1/8	2	2
J. D. Newton	2	2	2	2 3/8	2	2	2
W. and G. W. Hindes	2 1/8	2 1/8	2 1/8	2 1/4	2	2	2 1/8
J. M. Manson	2	1 7/8	1 7/8	1 3/4	1 7/8	2	1 7/8
Mrs. Henderson	2 1/8	2 1/8	2	2 1/8	2 1/8	2 1/8	2 1/8
HEAVY BREEDS.							
T. Hindley	2	2	1 7/8	1 7/8	2 1/8	2	2
J. A. Cornwell	2 1/8	2	1 7/8	2	2	1 7/8	2
E. Morris	1 7/8	2	2 1/8	2	2 1/8	1 7/8	2
A. E. Walters	2 1/8	2 1/8	2 1/2	1 7/8	1 7/8	1 7/8	2 1/8
R. B. Sparrow	2 1/8	2	2	2 1/8	2 1/8	2	2 1/8
Nobby Poultry Farm	2 1/8	2	2	1 7/8	2	*	2
A. Shanks	2	1 7/8	2	1 7/8	2	2 1/4	2
R. Burns	2 1/4	2 1/4	2 1/8	2 1/8	1 7/8	2 1/8	2 1/8
E. Oakes	1 7/8	1 3/4	1 7/8	2 1/8	2	2	2
W. Smith	1 3/4	2	1 7/8	1 3/4	1 7/8	1 3/4	1 7/8
E. Stephenson	1 7/8	1 7/8	2 1/4	2 1/8	2	2 1/8	2
E. F. Dennis	1 7/8	1 7/8	1 7/8	1 3/4	1 7/8	1 3/4	1 7/8
J. E. Ferguson	2 1/8	2 1/4	2 1/4	2 1/4	2 1/8	1 7/8	2 1/8
R. Holmes	2	2 1/8	1 7/8	2 1/8	2	2	2
D. Fulton	1 7/8	1 7/8	2	1 7/8	1 7/8	1 3/4	1 7/8
A. Gaydon	2 1/8	1 7/8	2	2 1/8	2	2	2

GROUP PENS.

—	Average.	—	Average.
	Oz.		Oz.
LIGHT BREEDS.			
Miss E. M. Ellis	1 7/8	S. Chapman	2
E. Chester	2	Avondale Poultry Farm	1 7/8
C. A. Goos	2	R. C. J. Turner	2
Geo. Lawson	1 7/8	W. D. Evans	2
Thos. Eyre	2	G. Langbecker	2
H. A. Mason	2	C. M. Pickering	2 1/8
C. Towers	2	S. L. Grenier	2
W. Morrissey	2	A. J. Anderson	1 7/8
H. P. Clarke	2	Mrs. R. Hodge	2
HEAVY BREEDS.			
Parisian Poultry Farm	2	Mrs. G. H. Kettle	2
H. M. Chaille	2	G. Flugge	2 1/8
G. Muir	1 7/8	J. E. Smith	1 7/8
R. C. Cole	2 1/8		

* Eggs of Nobby Poultry Farm's F. bird were not weighed.

POULTRY CONFERENCE.

The Annual Conference of poultry enthusiasts was held at the Gatton Agricultural College on Wednesday, the 29th September. The visitors were taken round the competition pens during the morning by the College expert, Mr. A. G. Harwood. In the afternoon the conference was held in the gymnasium, the Principal (Mr. Cuthbert Potts) presiding.

On behalf of the Minister for Agriculture, Mr. Potts welcomed the visitors. He said he was sure the conference had done good in the past, and they would do more good in the future.

THE POULTRY TICK.

The Chairman remarked that the first item on the agenda paper was a discussion on the poultry tick, which subject Mr. Gould had promised to introduce. Unfortunately, Mr. Gould was not present. He (the Principal) understood that the ticks were migrating down, and had reached Toowoomba. He thought the conference might deal with the question, and he invited anyone who had experience of the pest to bring the subject before the meeting.

Mr. Cole (Toowoomba) said the tick was pretty prevalent in Toowoomba. The only remedy he knew of was to swing the perches and well spray the houses with kerosene emulsion. That had been done before in Bathurst (New South Wales), where he had had previous experience of the tick. In Toowoomba some fowls were sick, and they were said to have some other trouble, but it was really the tick. It was a very serious trouble.

Mr. Greasley (Ipswich) said he had had some experience with the tick in Ipswich. He did not know where they came from, and he did not know he had them until he could almost shovel them up. The only way he found to get rid of them was to loosen up everything, use plenty of hot tar, and swing the perches as the previous speaker had mentioned.

Mr. Morris said he had seen the red mite pest, and had seen one man get rid of them by using a blow-pipe, similar to that used by painters. Might not this remedy be also applied to the tick pest?

Mr. Cole: A lot of people think they have no ticks because they do not find them in the daytime, but they can be found at night if they are present in any fowlhouse. He thought they should do away with wood altogether, and have iron everywhere in their houses. Cracks and crevices only harboured the ticks. He understood that the ticks were cannibals, and would live on each other for a long time.

Mr. Anderson said he always made a practice, in getting birds by rail, to burn the crates as soon as he took the birds out. He understood that the tick would lie dormant for from five to seven years, even if in a bottle. He agreed that the tick was nocturnal in its habits, and it did not appear until the warmth produced by the birds caused them to do so. He thought tarring the place was the best. Some people suggested liming, but he found that it was possible for ticks to be harboured by the lime caking. He thought it would be a good thing if the Department issued a leaflet on the poultry tick. Articles were published in the South, and no doubt these could be improved upon and made suitable to this State.

Mr. Longegorff (Nobby) said the tick was often conveyed in the railway crates.

Mr. Murray said he had been told that the only way to get rid of the tick was to burn everything. He was judging poultry at Goondiwindi in 1918, and there were a few ticks about then. In 1919 there was no show, but when he was up there again this year, they were very thick. The poultry steward at this place told him that the ticks bred in every place, even in the crevices of doors. The show committee had decided to destroy the whole lot of their coops.

Mr. Harwood said he had been told at one of the poultry conferences at the College that the pepperina trees were a great harbour for the tick. He at once proceeded to make investigations into the matter, and he found that these trees were no worse than any other in that respect, but that the ticks would gather together in any protected place they could find. As a matter of fact, practically every farmer in the Lockyer district had pepperina trees growing in his yard, and they had not discovered that these trees were any worse than any other for harbouring ticks. Thy would congregate even in the overlaps of corrugated iron. He had heard that a collapsible metal crate had been invented. If these were brought into existence they would prevent a good deal of the transmission of the tick on the railways. He thought it was the work of the Government to undertake the solution of the trouble. Any person who had been proved to have poultry tick in his yard should immediately be interviewed, and he should not be allowed to dispose of his birds while his yard was in such a state.

The Chairman said one or two points had been brought forward during the discussion. There was the suggestion that a pamphlet be issued by the Department, the proposed destruction of crates from infested districts, and later, they had the suggestion from Mr. Morris that railway crates were responsible for the transmission of the tick. He thought definite resolutions might be submitted on these matters. They should not wait until the tick invaded their own yards before they attempted to secure some improvement.

Mr. Walters moved that the Agricultural Department be asked to allow Mr. Beard to prepare a pamphlet on the tick, and the best methods of combating its spread.

Mr. Harwood said he had noticed that an announcement that Mr. Beard had come across a tick trap. If that were so, the inventor should be given assistance in bringing his invention before the public.

Mr. Anderson seconded the motion. He thought the Department's pamphlet might deal not only with the cause of the pest, but with the best method of combating it, and should give some data as to the destruction it was causing. Probably such a pamphlet could be issued before the end of the year.

The motion was carried.

Mr. Campbell moved that the Department be asked to investigate the extent of the present area affected with the pest, and also to devise some means whereby the spread of the pest can be combated.

Mr. Holmes: Mr. Beard, speaking at Toowoomba recently, said there were ticks all over the State.

Mr. Campbell: If that is so, it is better for us to know it.

Mr. Murray: In South Brisbane I know a man who had ticks in his yard, and after trying to get rid of them for six or seven weeks without success, he gave it up, and decided not to keep birds.

Mr. Anderson stated that there was no need for the last motion, which was covered by the first. The pamphlet which had been proposed should, he thought, contain statistical information.

The Chairman: You also asked that the pamphlet be printed before the end of the year. In this motion we have a problem which will take much longer than that to solve.

Mr. Anderson: Then I will second the motion. I think it is desirable to get a full Departmental inquiry.

The Chairman said: If the Department did take up the investigation, he thought it should deal with the problem of railway transit, as well as the other questions raised, which were not mentioned in the first motion.

The motion was carried.

Mr. Cole: Will this debar anyone who is competing from what might be pronounced to be an infested area from again competing? He may not have the tick in his own yard. Will this debar him from competing?

The Chairman: I do not think that question can be answered until the Department has arrived at some definite conclusion on the matter. From now on, you may be sure we shall take strict precautions about the competition pens, as well as in regard to any crates which come here. It is possible that a regulation will be introduced to enforce the destruction of all crates.

One of the visitors suggested that the railway crates should not be taken away from the station, but that persons getting birds should take them out of the crates at the stations.

The Chairman: I do not think there will be any difficulty in framing railway regulations.

Mr. Holmes remarked that it would always be found that if a man tackles these problems he can overcome them. Cleanliness was one of the great features in combating disease of any kind.

MARKETING OF EGGS.

Mr. Campbell was then asked to read the report of the N.U.P.B.A. on the action taken in connection with the marketing of eggs.

The Chairman mentioned that at the last conference the Association had been requested to give consideration to the feasibility of forming a co-operative company for the distribution of eggs, or any other scheme for the control of the market.

Mr. Campbell stated that, though the Association had not been successful in forming the proposed co-operative company, it had been able to arrange that the eggs belonging to members of the Association do not fall below 1s. 4d. a dozen in price. If the eggs did not bring this price they were put into cold storage, and members received an advance of 1s. a dozen. When the eggs are sold from cold storage, the producer gets the balance, with any profit which may be made after the payment of commission and expenses for the storage. At the sale previous to this arrangement, eggs brought 1s. 1½d. to 1s. 3d. at one time, with the prospect of going still lower in price. Since the arrangement had been made, the eggs supplied by members of the Association had not brought less than 1s. 6d. a dozen, with the exception of one occasion. The Association had endeavoured to fix the price higher than 1s. 4d., but a large number of eggs were being sent here from Adelaide at the time, and this brought the market down, the consequence being that the Association had to accept less than they otherwise would have done. He urged all poultrymen to support the Association. They had a scheme of co-operative marketing in hand, but without the support of the producers the Association could not do anything. With their support, however, it would be possible to achieve anything in that connection.

The Chairman said that apparently the conference had done a lot of good in bringing up this matter at the last gathering.

Mr. Harwood: Might we congratulate the N.U.P.B.A. on what it has done? I noticed a reference in the "Poultry Bulletin" last week which was very favourable to the eggs sent down to Sydney by the Association. In fact, it appears that Sydney and Adelaide have got behind the Queensland members in this connection.

The Chairman: This scheme has been confined to members of the N.U.P.B.A. I take it this is because it is only for members that the Association can guarantee infertile eggs, which are necessary for cold storage. In that case, I think you all ought to join the Association, and get all you can. (Applause.)

Mr. Campbell: We confine the scheme to members because we have no control over any outsiders. The aim of the Association is to bring out of the cold storage an absolutely first-class article. It is the intention of the N.U.P.B.A. to brand all the eggs for cold storage. Cold store eggs, at the present time, are largely used for manufacturing purposes, cake making, &c., and there is not the slightest reason why the cold-store eggs should not be used in every kitchen in Queensland. It would not affect the use of the new-laid egg, because they are not used for the same purpose, but people would do better to buy cold-store eggs for cooking instead of grocer's eggs of very doubtful quality. We are going to try to induce people to eat more eggs, so we shall not interfere with the price of the new-laid eggs during the off season. We cannot do anything, however, unless we are backed up by the poultrymen as a whole. We appeal to you to come and give us a hand to do something for your own benefit.

Mr. Fallon: How is the N.U.P.B.A. in Brisbane going to deal with eggs from outside districts?

Mr. Campbell: The Association has branches in Toowoomba, and also in Warwick. They can collect local eggs on our behalf and send them down. The producers can send them down to us collectively or individually. Of course, commercially, country eggs are not new laid. They are "case eggs."

Mr. Morris: Eggs sent to Brisbane would not be new-laid, but if sent to the N.U.P.B.A. and opened up they would be. Is that it?

Mr. Campbell: Eggs sent down in a case might be the same age as new-laid eggs produced in Brisbane suburbs, and yet not be classed as new-laid.

A vote of thanks was accorded to the N.U.P.B.A. for what it had done in connection with the marketing of eggs.

Mr. Campbell returned thanks for the vote.

TYPE—BREED CHARACTERISTICS.

Mr. Harwood dealt with the subject of type and breed characteristics. He said the main topic throughout the world in connection with the industry was that of type. He said there was becoming too great a distinction between the principles adopted by the exhibition man and that followed by the utility man. One man went to one extreme and the other went to the other extreme. He thought there was only one specialised club in the State. He quoted from authorities in regard to certain points, and condemned the tendency to extravagance in connection with those points. He thought some one should attend the world's poultry conference (utility man, for preference), and get some knowledge there of what was done in regard to type. Regarding Black Orpingtons, it had been suggested that the birds they had developed in Australia should be called "Australs," or some other new name. He certainly

thought they should be judged as pure Australian birds rather than by the Orpington standards. In future, he was going to be more strict in the competitions in regard to standards. The variation in the standards of the Orpingtons had been remarkably changed. There must be something at the bottom of it. In Orpingtons, for instance, a deep, full front was desirable for a table bird, and the utility man had not bred on that line. That would have to be altered, and a medium line established. The trouble with the standards was that they were not definite enough in many respects. For instance, one characteristic might be short legs, but it does not say how short, and they could not get the best egg-producers with the deep, full front, as set down in the standards. A total of 25 points is provided for the head of an Orpington. The standard provides that a comb must be small and erect. The consequence was that, should a comb be inclined to fall on one side, the exhibitor loses points. How many of the Orpingtons in the competitions had a proper clear eye? This mixing up of the standards made it very hard for the breeder to know what to aim for. The place for the utility breed was in the competitions, not in the show pen. Constitution, however, was the main thing, and the lack of constitution was what they were suffering from mainly. However, they were improving, and Southern visitors had been impressed with the constitution of the Queensland birds. Regarding Leghorns, the day of the tiny white bird was passed. Length of back and depth had been brought about by aiming at production. Lung and heart room had also been given consideration. The English standard had established some extremes, but the exhibition man cannot be blamed for breeding for these, because they are what are being asked for.

Mr. Fallon: Is it your intention to judge Orpingtons on the English standard or on the utility standard?

Mr. Harwood: Midway between them. But it is impossible to be too strict. I, myself, would rather hear the so-called Black Orpingtons in the competitions called "Australs" than I would Black Orpingtons. Specialised clubs would do more than anything else to encourage a man to study the breed of a particular bird. He thought the conference might pass another motion in regard to the change of the name of the Black Orpingtons.

The Chairman said: Regarding the suggestion that the so-called Black Orpingtons might be re-named, I do not think we can do anything here. So long as they are called Black Orpingtons, so long will we have to judge them as such. We are not going to be too severe, however.

In reply to a question, *Mr. Harwood* said he had not a bird in the competition which would win a prize at any important show as an Orpington.

Mr. Campbell: Is a white tip on the wing allowed in a Black Orpington?

Mr. Harwood: No. White is not wanted. If you ask for a Black Orpington you do not want black and white. I find that in chickens, however, those which show the most white generally finish by becoming the best sheen birds.

THE COMPETITIONS.

The Chairman dealt with the subject of—

Have our Existing Egg-laying Competitions Served their Purpose?

"This subject is brought forward because our egg-laying competitions have been running for years. If they have been of value, then we should be in a position to draw certain definite conclusions from the results, either with regard to breeding or feeding or commercial value. Yet, I can find no such deductions drawn from any of the existing competitions. Is it because no such deductions can be drawn? The matter is important, for, if the answer is in the negative, we are wasting time in merely running an annual hen race for the special excitement of a limited number of poultrymen.

"I propose to briefly analyse this matter with regard to the important subject of breeding. This, I think, is the most important question. If our egg-laying competitions have enabled us to breed a more proficient egg producer, then they have justified their existence. But even so, they must be pointing the way to still better results, or else they should be altered or dispensed with.

"I am submitting figures obtained from the results of the Hawkesbury and the Gatton College competitions. Individual breeds have been dispensed with, and aggregates and averages drawn from a total of the competing birds each year. In the later figures, a distinction between heavy and light breeds is shown. This procedure is entirely justified, for the competitions have largely concentrated attention to one or two breeds. In any case, the general drift of the competition effects will be demonstrated.

Thus the Hawkesbury results read as follows:—

—	Winning Total.		Lowest Total.		Highest Average per Hen.	Lowest Average per Hen.	Average Production per Hen of all Competing Birds.	
1902-3 ..	1,113		459		185·5	76·5	130	
1903-4 ..	1,308		666		218·0	111	163	
1904-5 ..	1,224	217·9	532	100·44	204	88·7	152	156·4
1905-6 ..	1,411		635		235·2	105·8	166	
1906-7 ..	1,481		721		246·8	120·2	171	
1907-8 ..	1,474		665		245·7	110·8	173	
1908-9 ..	1,379		656		229·8	109·3	180	
1909-10 ..	1,394	233·8	739	111·83	232·3	126·2	181	177·3
1910-11 ..	1,321		658		220·2	109·7	168	
1911-12 ..	1,389		687		231·5	114·5	184	
1912-13 ..	1,461		603		243·5	100·5	178	

Up to this stage all birds had been tested in groups of six.

Individual Hens.

1913-14 ..	1,360	724		245	23	177	
1914-15 ..	1,541	705		288	139	181	
1915-16 ..	1,449	506	123·6	278	83	192	175·4
1916-17 A ..	1,526	924		..	..	162	
B ..	1,497	749		..	..	165	
1917-18 A ..	1,525	923		288	23	209	
B ..	1,613	931		312	49	202	
1918-19 A ..	1,448	860	146	282	36	199	198·67
B ..	1,517	815		324	38	189	
1919-20 A ..	1,438	988		281	64	203	
B ..	1,428	745		303	63	190	

While the Gatton results are—

—	Highest Totals.		Lowest Totals.		Highest Average per Hen.	Lowest Average per Hen.	Average per Hen of all Competing Birds.	
1906-7 ..	1,480		814		246·7	135·7	190·8	
1907-8 ..	1,538		589		256·3	98·2	180·1	
1908-9 ..	1,374	248·12	902	141·5	229·0	15 ·3	2 2·8	197·72
1909-10 ..	1,532		939		255·3	156·5	207·1	
1910-11 ..	1,520		1,0 1		253·3	166·8	207·8	
1911-12 ..	1,391		631		231·8	105·2	194·8	
1912-13 ..	1,534	252·14	968	158·14	255·7	16 ·3	2 7·5	213·9
1913-14 ..	1,564		1,109		260·7	18 ·8	218·6	
1914-15 ..	1,545		1,165		257·5	194·2	225·8	
1915-16 ..	1,530		871		255·0	145·2	222·8	

Up to this stage all birds had been tested in groups of six.

1916-17 ..	1,542	915		289	62	209·7	
1917-18 A ..	1,652	822		272	36	20 ·0	
B ..	1,470	769		335	36	182·8	
1918-19 A ..	1,573	936	150·4	303	110	198·0	198·6
B ..	1,389	869		290	115	187·0	
1919-20 A ..	1,627	1,111		289	121	208·0	
B ..	1,619	953		335	86	204·7	

Examination of these tables seems to emphasise that we have not improved our birds' capacity by any breeding information got from the competition results.

Thus, an examination for the highest group totals shows a fairly steady increase with time in the Hawkesbury results, as also at Gatton. This is more evident by grouping together successive years and averaging, as shown in figures alongside the brackets.

In the same way there seems to have been a rise in the lower limits at Hawkesbury, but not so at Gatton.

This change in the general average of all birds is still less marked; in fact, there has been a falling-off at Gatton during the last few years.

We can gather more information by examining the highest and lowest average per hen in each year, especially with reference to the highest and lowest individual score in the single-hen tests of latter years.

Thus, at Hawkesbury, we have a pen averaging 246.8 eggs per bird, and the next year, an average of 245.7 eggs per bird. It is certain that each bird of the group did not lay the same number of eggs; therefore, some laid more and some less. Thus, we are forced to the conclusion that there existed in our flocks, in 1906, individual birds of equal capacity with those since found by single testing. For there is no indication in the single tests of a capacity beyond the possibility of individuals undiscovered in the groups.

The same argument applies to the lowest capacity, and the single testing shows the constant recurrence of birds of low order. Now, it must be taken that one of the effects of testing layers would be to induce breeders to use their proved higher producers. In group testing we can readily understand that indifferent producers would be included in the breeding pens. But this should not obtain where the birds are single-tested. Yet this single testing does not seem to have had any effect in raising the higher limit, nor does it seem to have prevented the production of a fairly definite proportion of the lower grades. Certainly, there seems to have been an increasing improvement in the averages, but is this due to breeding, or is it merely the result of better technique in rearing and feeding? Certainly, much of the earlier improvement was due to this cause, and this fact detracts from the importance which can be attributed to breeding. However, the results do indicate that it is gradually becoming easier to produce birds of the higher capacity, while fewer of the lower grades are reared. The progress made, however, is disappointing, for the possibility of improvement should be right up to the average of the winning pens.

Now, it is necessary to go back to the origin of these egg-laying competitions. It is important to note that they were called competitions, and this is exactly what they are. When inaugurated, the conditions were designed in such a way as to attract the interest of poultrymen. In effect, they demonstrated large variations in the capacity of different hens to lay eggs. But in no degree could the organisation be deemed to be carefully arranged for purposes of scientific experiment. The variability of the material supplied for test alone was sufficient to obviate this.

Later, when the single tests were introduced, a distinct effort was made to convert the competitions into a breeding test. This was done, however, without elimination of the competition element. Again, the variability of material supplied for test destroys the value as an experiment. Hence the egg-laying tests have remained competitions chiefly, and until there is a radical change in conditions it cannot be hoped that they will yield far-reaching effects.

Thus several points have arisen during the competition.

A. *The weight of egg.*—This is a point required for commercial value. But who can learn from the competition results whether weight of egg is an hereditary characteristic, or whether it is largely determined by nourishment—nourishment, not during the period of laying, but nourishment from the time the mother was mated up, right through incubation and rearing, and up to the stage of laying. Mr. Harwood advocates early incubation and forcing the pullets into an adult moult prior to their commencement to lay. In the same way he likes to force his stud birds into a moult early and allow them to feather up well before mating. May not this provision, or some similar provision, for nourishment of the on-coming pullet be a greater factor in determining weight of egg than hereditary influence? It seems more than probable, because the converse would seem to be certain, viz., that a starved pullet would not have the power to produce sufficient egg material to form fully-sized eggs.

B. A second point was soon impressed. In the race for high fecundity and number of eggs, there was undoubted neglect of stamina, constitution, and type. Of these, perhaps, type was the least important, but the other two characteristics were absolutely essential if our poultry were not to be ruined. The various competitions took action in this respect, and for combating this evil I like the Gatton regulations best, because all competing birds are judged, and so the whole public is in a position to know the grading of each pen with regard to these important features. The winning pen may be of no type, or possess low stamina, or it may be classed as first grade. If so, how great the advantage to all concerned, and, if not, then the breeder knows his position.

But fundamental behind all these features is whether we can transmit with reasonable certainty the good characteristics of tested hens. It is a problem of breeding, and the competition results give practically no information with regard to this. How can they? Pens are accepted from practically any poultry-raiser. No knowledge of the breeding is submitted. There is no systematic follow-up of tested birds. Of course, all this may be done in individual yards, but, if so, it is kept secret. The competitions are merely a record of results obtained by design or chance by various breeders. As such it is impossible for them to gather information of value to the problem of breeding.

That some breeders are working on good lines is indicated in the single hen records. Here we find some breeders putting forth, year after year, pens of exceptional equality and of high fecundity. In other pens we find a big variation between the capacities of the birds entered.

Again, we find some competitors holding their position for several years, and then suddenly, and without apparent reason, losing their place near the top. When enquiry has been made it is nearly always found that this is due to change of cock bird. It must not be forgotten that the male is one side of a mating, and much more than one side where mass mating takes place, as with poultry. It is quite understandable, therefore, that a breeder may owe his continued success for a few years to the chance possession of a prepotent male. Yet the competition conditions make no provision for gleaning information with regard to this.

Further, this side of the problem is rendered of more importance because of the experiments of Dr. Raymond Pearle. Dr. Pearle asserts, and he is supported by a mass of experimental data, that high fecundity is transmitted by the male bird and not by the hen. That is, that a high-producing hen cannot transmit high fecundity to her daughters, but she may transmit her power through her sons. The pullets derive the egg-laying capacity from their sires and not from their dams.

If this is so, why our extreme care in testing hens and our utter neglect in testing cock birds? Perhaps it is our failure in this respect which accounts for failure of our competitions in effecting a truly evident improvement in fecundity.

Certainly it would be more difficult and complicated to test cock birds than to test hens. But the indications are that by doing this we could establish real and permanent improvement in our flocks. Therefore I would suggest the following tentative scheme:—

(1) Hens would be tested to find good and bad layers.

(2) Three hens of each class would be mated with the cock bird under test and trap nested. Twenty-five eggs of each class would be incubated.

(3) The pullets in equal numbers from the good and bad layers to be single tested.

(4) Cock birds producing nothing but good layers would be given a seal ring and certificate.

(5) Cockerels, by a certified cock bird and out of a proved good layer, would be eligible for future test. In any case, these cockerels should be valuable stud birds.

(6) Any cock bird producing bad layers from proved good layers to be condemned.

DATE OF CONFERENCES.

Mr. Parker: Those of us who have attended these conferences appreciate the good we get from them, and we always go away feeling that we have learned something. At the same time I think the conferences being held at this time of the year makes it rather awkward for many breeders, as it is in the middle of the incubating season. It was exercising their minds in Brisbane that some other date might be more suitable. Our Society suggested that it be held in March.

The Chairman: I would like it known that in this matter we at the College are only too willing to alter the date to suit the convenience of most of you. We are not in any way committed to September, and if you have found that that date is not convenient, and you give us a date that you are confident will suit better, we will undoubtedly hold the conference somewhere near the time you suggest.

Mr. Campbell strongly supported the proposed alteration of the date. He knew that it was very inconvenient for many breeders to get away. Another reason for holding the conference in March was, that they would be able to see the complete scores in the competitions, which would be an object lesson.

The Chairman: I will take this as a motion that the next conference should be held in March.

The motion was carried.

GENERAL MATTERS.

Mr. Walters: Anyone looking at the scores would think that Orpingtons and White Leghorns were the only breeds that can lay eggs. Could not the College show some other breeds, as non-competitors, to show against the breeds in the competitions, for the purpose of comparison?

The Chairman: I think we should not compete, or enter non-competitive birds against those in the competitions, but for the sake of the College itself, and for others who might inquire, we might do something in the way of an experiment in that direction.

Mr. Holmes: I think the stipulation that each competitor must be prepared to supply 50 stud birds, or 100 settings of eggs of the same breed as his birds in the competition, should be strictly enforced.

Mr. Cole: Are you going to debar a man because he might not, for instance, be able to supply more than 40 birds?

The Chairman: I regret that I have not the organisation to enforce this regulation, not because I want to kill the enthusiasm of young men, but you have to recognise that these competitions are to a very great extent the medium whereby breeders are advertised. A man is advertised because his birds come near the top. We ask that a competitor should be able to supply 50 stud birds or 100 settings of eggs of the same breeding, though not, of course, from the same bird. We expect a competitor who signs these declarations to observe them, and be able to adhere to them. To carry out an inspection of the yards as suggested by Mr. Holmes is a practical impossibility, but if the breeders of the State think there is anyone doing harm by succeeding at this competition and then selling birds which are not of the same breeding—birds, in fact, which have been picked up in markets, and which are of indifferent breeding—the Associations should black-ball such a person. You are asking the College to take on the work which justly belongs to your Associations. As a matter of fact, we have taken action against this sort of thing during my time at the College.

Mr. Harwood: If you become a member of an Association in England, one of the benefits you receive is that you are protected from illegal practices. If any exhibitor has been proved to have carried on illegal practices, he is tried by the Poultry Club of England, and blacklisted. The Club publishes each year the names of such persons.

Mr. Murray: I think we ought to increase the number of birds in the pens to twelve. I think, also, that the incubator house is not a credit to the College nor to the Government.

The Chairman agreed that the house was not what it should be.

Mr. Parker: I do not know that we get the most out of these conferences. I think we might discuss such questions as the methods of feeding, &c. We should introduce some of the questions ourselves, and not leave all the work to the College people.

The Chairman: I like this suggestion. If there has been one fault in connection with the conferences, it is that to a great extent the work has been left largely to the College. Last year was the only exception, when the N.U.P.B.A. was asked to take up the matter of marketing eggs. It lies rather with the poultry people themselves to discuss subjects and then bring them before conference. I would suggest that you bring this matter up in your Associations during the time before the next conference, and if you have any subjects for discussion, you might ask the College to have them included in the programme for the day. I hope you will have them in in time to be included in the next conference, which, I dare say, will be held in March next.

Votes of thanks were accorded to the Principal and Mr. Harwood for their assistance and the information that they had supplied, and the conference terminated.

The visitors then inspected the feeding of the birds, and after partaking of refreshments, were driven to the College siding, where they embarked on the Toowoomba or Brisbane train.

The Horse.

THE SUFFOLK PUNCH.

We have several times in this Journal discussed the merits of the Suffolk Punch, both as a draught horse and as a saddle horse. The following extract from the "London Live Stock Journal" will show that this class of horse is greatly appreciated in England, and commands high prices from breeders and agriculturists:—

SUFFOLK HORSE SOCIETY'S SALE.

There being a record entry of 345 animals for this year's summer sale of Suffolk Punches, held under the auspices of the Suffolk Horse Society, at Ipswich, it was found necessary to spread the sale over two days. The opening day of the sale, with which there was also associated a show of the breed, was on Wednesday, when foals and mares with foals were offered for sale. There was a big collection, in which the horse foals strongly predominated. Whilst there was a fairly good trade for these, the demand for the filly foals was exceptionally keen. The mares, of which there were some nice specimens, sold readily. A very large company of buyers were present from all over England, and also from Ireland there was strong evidence that the Suffolk Punch is making friends in places far removed from Suffolk, and not a few were wanting to start studs. Some highly promising foals were bought on behalf of the Minister of Agriculture by Captain Trollope, and among these were two smart young colt foals by Mendham Gold Boy and Morston Gold Guard. The foal by the latter horse was the second prize-winner in the class for horse foals, and he was bred by Mr. Threadkell, of Framlingham.

"Filly foals made a very nice show, and the trade may be regarded as excellent throughout. The winning foal, belonging to Mr. E. H. Williams, of Alderton, was a compact, well-made daughter of Sudbourne Arab, of nice colour, and she sold to Mr. J. Rose, of Stradbroke, for 165 guineas. Mr. Rose, who recently demonstrated at the Framlingham and Halesworth Show that he has the real breeder's eye, likewise bought another lovely filly foal belonging to Mr. Williams for 145 guineas. The second prize filly foal by Sudbourne Beau Chief, a beautiful deep red chestnut, which is likely to make a fine mare, did not reach her reserve, bidding for her reaching 240 guineas. The third was an exceptionally nice daughter of Morston Gold Guard, who belonged to Mr. F. Newton Pratt, who sold, well worth the money, to Mr. R. F. Wrinch for 105 guineas. Many of the filly foals exceeded the 100 guineas figure, and among those which went to distant parts of the country was Mr. James Forest's well-bred daughter of Sudbourne Beau Chief, who made 120 guineas, to Mr. R. W. Cooper, of Guist. Then Major Workman, who came from Ireland, secured a typical Punch filly foal, bred by Mr. A. Carlyle Smith, and he likewise acquired her dam, Ashmoor Trophy, a beautiful daughter of Sudbourne Arab, for 300 guineas. Mr. A. G. Welch, of Worlingham, near Beccles, acquired some very useful filly foals, among which is the 103 guineas youngster by Earl Grey and one by Cider Cup, bred by Mr. J. W. Moore, of Peasenhall, which cost him 101 guineas. Mr. H. G. Cushion bought another of the progeny of Morston Cider Cup and bred by Mr. M. Moore for 100 guineas.

"It was a very attractive contingent of eight mares and their foals which were consigned from Bawdsey Stud of Sir Cuthbert Quilter, and for them an average price of £280 was made, the principal buyer being Mr. W. Kindred, of Great Glemham, who gave up to 430 guineas for a four-year-old by Bawdsey Marshall Ney, a sire who has left some fine stock behind him. Another nice daughter of that stallion cost Mr. Kindred 350 guineas, but for a third, a six-year-old by the same horse, he gave place to Mr. A. G. Welch. It was a typical lot of Punches which Mr. Kindred acquired, most of them, it is understood, for the formation of the new stud which Mr. P. A. Bayman is forming at Letheringham Abbey. Mr. E. H. Preston was another keen buyer, and his purchases included, for 300 guineas, a charming mare and her foal. Captain Borrett, of Cransford, another new comer into the breed, secured for 350 guineas a well-bred five-year-old mare by Ashmoor Sir Grey; she was reserve in her class.

"The judging for the prizes was undertaken by Mr. Godfrey Hempson and Mr. R. H. B. Wilson, and the sale was conducted by Mr. Alfred Preston, who has officiated at the society's functions from their very commencement some thirty years ago.

"The results of the first day's sale may be considered eminently satisfactory, the total proceeds being £12,457 4s. for 104 foals and 38 mares."

The Orchard.

CITRUS GROWING IN CALIFORNIA.

We are obliged to Mr. R. Henderson, Edinburgh, for the following notes received by him from a correspondent in California on the subject of Citrus Growing in that State:—Having noticed in a recent number of your Journal (July, 1920), an article on 'Citrus Growing in California,' by the Hon. J. M. Hunter, I became interested, and wrote to Mr. Griffith (Azusa, California) for further information.

His answers were very interesting, and the following extracts may prove so to other citrus growers:—

"*Fertilisers.*—In the spring of the year we put on our groves, packing house tankage, a by-product of the meat industry, at the rate of 15 to 25 lb. per tree, according to size. This tankage averages 8 per cent. nitrogen and 8 per cent. phosphoric acid. Any time during the year, preferably late summer or fall, we put on animal manures at the rate of 15 to 30 tons per acre, according to the size of trees. This is either broadcasted down the rows and cultivated under, or put in deep furrows made especially for this purpose and then covered. The latter is the latest, and I think the best, method yet devised. In early fall, when our rainy season comes on, say, 15th September, we sow our orchards to a legume, such as field peas, clover, *Melilotus indica*, &c., and allow this crop to grow undisturbed by cultivation during the winter. About February or March, depending upon the weather, we disc harrow this growth under for "green manure." We sometimes use so-called inorganic fertilisers, such as ammonium sulphate, and sodium nitrate; however, I seldom use these except as "tonics" for decadent trees.

"*Irrigation.*—Our rainy season here begins about 1st October, and lasts until about 1st May. I say 'about,' for no two years are the same as to rainfall. About the time that the rainy season closes we begin irrigating our grove. First we go up and down the rows with a furrowing machine, which is so designed as to leave behind it three furrows. When a round of a row is completed we have six furrows. Our water is conducted in a huge system of cement piping from the mountains, and led down to our private pipelines through the cement pipes mentioned above, which belong to a company formed especially to render this service. Each ranch is entitled to so many shares (reckoned according to the acreage of the ranch, or grove) in this company, which, as you see, is co-operative. So the ranchers really own their own water companies and their distributing systems. Every ranch is equipped with cement lines running at the head or upper side of the grove, with standpipes coming up above the ground for each row. When irrigation is desired the water is turned into these private lines from the company's lines, and, running down the private line, rises in these standpipes and flows out, regulated, of course, in its flow into the furrows by a large cap, which can be screwed to a larger or smaller opening. The length of time the water is allowed to run in the furrows depends upon the character of the soil. Heavy types take a less amount of water than light or sandy types. We in this neighbourhood irrigate consistently every thirty days during the dry season.

"*Cultivation.*—Two or three days after irrigation ceases on any lot we go over the ground, both up and down the rows and crosswise with a cultivator. We use Fordson tractors on this ranch and pull a 6-ft. cultivator behind them. When we have any litter on the ground, like there is after the first discing-in of the winter cover crop I mentioned above, we continue to use the discs behind the tractors until all is in the ground.

"*Grading.*—The grading and sale of the fruit is handled exclusively by the California Fruitgrowers' Exchange, a co-operative marketing corporation. If I should attempt to give even a glimpse of the working of this huge Exchange I would wear out this typewriter."

ERADICATION OF WHITE-WAX SCALE.

The Director of Fruit Culture, Department of Agriculture and Stock (Mr. A. H. Benson) has received the following report on Experiments in Combating the White-Wax Scale, in the Toowoomba District, from Mr. W. Leslie, Assistant Instructor in Fruit Culture:—

I beg to report as follows on experiments carried out with a view to proving the best means of combating White-Wax Scale:—

This pest developed excessively in Toowoomba district during the months of April and May, and the following control measures were tried:—

I.—FUMIGATION WITH HYDROCYANIC ACID GAS.

A pomelo tree in the garden of R. Walsh, Goodwood, Newtown, was infested with White Wax Scale. A gas-tight bell tent was placed over it and hydrocyanic acid gas was generated inside the tent by placing there on the ground a vessel (earthenware) containing a mixture of 4½ oz. water and 1½ oz. sulphuric acid, into which mixture 1¼ oz. of potassium cyanide was dropped. The tree was enveloped in the gas for about forty-five minutes.

II.—SPRAYING.

A mandarin tree in the nursery of R. W. Winter was heavily infested with the pest, and two insecticides were tried:—

(*a*) *Kerosene emulsion* was made by dissolving 4 oz. soft soap in one gallon of hot water, and then adding one quart of kerosene, the mixture then being vigorously agitated until a stable emulsion was formed. Water was added to make up to four gallons. This was sprayed on the tree so as to thoroughly wet all parts.

(*b*) The *Resin-Soda* solution was applied twelve days later. It was made by boiling ½ lb. resin and ½ lb. washing soda in 2 gallons of water, and, when dissolved, water was added to make up to 4 gallons.

RESULTS.

I. *Fumigation.*—A marked check appeared to be given to the growth of scale on the pomelo tree during the first two weeks after cyaniding, but signs of further development of the pest appeared subsequently. It appears that the unprotected young and most of the mother scales had been killed by the gas, but that some of the adult females remained alive, or that young developed under the protection of the bodies of mother scales subsequent to the cyaniding. The fumigation might have to be repeated in about twelve days' time.

II. *Spraying.*—Ten days after spraying with kerosene emulsion, the mandarin tree was examined and a number of young scales were observed. After spraying with the resin-soda solution, this tree was again examined, and a number of living young were seen and some of the adult scabs were alive and fresh.

CONCLUSIONS.

The conclusion arrived at was that after excessive infestation, any control measures were difficult to apply so as to effectively reach every insect, and that repeated spraying or cyaniding would be necessary to secure eradication, and, further, that the proper time to apply control measures would be in the early stage of infestation, when the insects were all young and but slightly protected by their waxy covering. The month of February appears to be the time for this early stage in the life of the pest in Toowoomba district.

TO GLAZE A CEMENT BARREL.

For the purpose of keeping meat in a cement barrel, the following preparation will, in all probability, accomplish the purpose:—Dilute neat commercial water-glass with about 25 per cent. of water, and apply a coat of the hot solution to the barrel with a brush. When thoroughly soaked into the wood, repeat the application. Allow it to dry. Then give it a coat of a solution of one part of sodium bi-carbonate to 8 parts of water, and let it stand till dry. The carbonic acid of the bi-carbonate separates the silicic acid from the water-glass which is soaked into pores of the wood, silicates the wood, and so makes it resistant to liquids, very durable, and easily cleaned.

Tropical Industries.

EXPERIMENTS WITH A NEW CACTUS RUBBER.

By Emmet S. Long, in "The Planters' Chronicle," Coimbatore, S. India.

It has recently been the writer's privilege to experiment with a gum extracted from the American cactus, and the results have so far been so entirely satisfactory that the subject should undoubtedly be of interest to everyone connected with the rubber industry. The war has certainly disclosed the necessity, or at least the desirability, of producing on as large a scale as possible a portion at least of the rubber requirements of this country, and for this reason, as well as for the economic betterment of the rubber industry itself, there has resulted considerable activity in the investigation of this important question.

Several years ago the writer had occasion to do considerable experimenting with the extraction and compounding with rubber of a gum derived from the Ocotillo plant, more particularly for the purpose of obtaining a gum which would replace guayule. This plant ranges from 5 to 25 feet in height, growing extensively in certain parts of Arizona and California. The results were satisfactory to a certain extent, but, due to the solvent-distillation method of extraction employed, the gum contained a large percentage of resins which seriously affected the cure when used in large percentages in the compound. Later, the destructive-distillation process with subsequent refining was evolved with the assistance of Government chemists, and it is reported that a much superior product is now being produced in large quantities at the large plant in Arizona.

The cactus gum mentioned at the beginning of this article is found in paying quantities in two different varieties of cactus—one the spineless, or cultivated cactus developed by Burbank, and the other the prickly-pear or wild species. Spineless cactus has been raised in many parts of Southern California as food for cattle. It was soon learned, however, that many cattle died, probably as a result of the insoluble gum content. The plant consists of a number of lobes somewhat similar in shape to an inverted hot water bottle, each lobe projecting outward and upward from the edge of the one underneath, the number of lobes depending upon the age of the plant. It is easily propagated by breaking off these lobes and planting them in the ground. The plant is very hardy, and has the advantage of being easily cultivated upon practically worthless soil, or in localities where the rainfall is very slight.

Prickly-pear, or *Opuntia vulgaris*, grows extensively in many parts of Arizona, California, Nevada, and other tropical parts of the United States. It is somewhat similar in structure to the spineless cactus, but is covered with long, sharp needles. It bears an edible fruit of a purplish colour, also covered with spines. Like the spineless, it is very easily propagated, and attains a height of 7 or 9 ft. Unlike Ocotillo and many other gum-bearing plants, the rubber in these two varieties of cactus occurs as a latex and yields a sticky white liquid from the abraded surface if pressure be applied by the fingers. By special treatment of the latex and subsequent refining, an amber coloured gum resembling smoked sheet in colour and guayule in physical properties is obtained, although the gum, when thoroughly dried, is considerably less plastic than guayule. It is reported that the gum can be produced at a price to compete favourably with guayule and crude rubber.

Following is a summary of some of the experiments made with gum from the spineless cactus:—

Sample 1.

	Per cent.
Smoked sheet rubber	50
Cactus rubber	40
Compound (mineral ingredients)	10

This compound was mixed upon the mill in the usual manner and contained only the amount of sulphur usually required to vulcanise a stock having 90 per cent. smoked sheet. It mixed easily on the rolls at a much lower temperature than that which would have been required for pure smoked sheet. The next day test strips were cured in the press, and were found to have high tensile strength and elasticity, showing that the gum vulcanises perfectly in about the same length of time required

for plantation rubber. Another portion was used to friction a sample of belting duck which was found upon examination to be thoroughly impregnated with the gum. A very tacky cement was made from the remaining portion by dissolving in benzol.

Sample 2.

	Per cent.
Smoked sheet	20
Auto reclaim	20
Cactus rubber	20
Compound	40

In spite of the fact that this stock was mixed on a relatively cold mill, it retained a sticky surface after calendering, and showed no tendency to bloom in the raw state. It would seem from this that the use of the gum in repair stocks and especially in those containing large amounts of carbon black would be advantageous, due to the necessity of preserving a tacky surface indefinitely, and the lower temperature at which the stock could be milled would minimise the danger of burning when use is made of certain organic accelerators. Part of Sample 2 was used to skim-coat and cover the fabric mentioned above, which was then made into a piece of belting.

Sample 3.

	Per cent.
Smoked sheet	10
Auto reclaim	20
Cactus rubber	17
Compound	53

It was the object of this mixture to estimate the value of the gum in a cheaper compound containing a larger percentage of minerals. No difficulty was encountered in milling, and the stock was made into various kinds of articles of comparatively good quality.

Sample 4.

	Per cent.
Cactus rubber	10
Reclaimed	60
Compound	30

This was a regular heel compound in which 10 per cent. smoked sheet would ordinarily have been used. The smoked sheet was replaced entirely with the cactus rubber without reducing the quality of the heels so far as could be determined. It is interesting to note that the reclaimed rubber used in this case would not stick to the rolls and could not be milled until about 2 lb. of the cactus rubber was added, when it immediately began to spread out evenly over the roll and continued to adhere thereto until the milling was completed. A number of rubber heels were made from this stock, all of which appeared to be of good quality.

It is the opinion of the writer, as well as of others who assisted in the experiments, that the gum is in every way equal to guayule and in some respects superior, among which may be mentioned the readiness with which it vulcanises and the extent to which it will actually replace crude rubber without an apparent reduction in the quality of the finished product. This would evidently place it in a class with crude rubber itself. For use in frictions where penetrating qualities are necessary the gum possesses this property to a marked degree.

The results of these experiments indicate that it may be only a question of time until America may have a new and important industry—the production of rubber from her desert and waste lands. Los Angeles is already the cynosure of the eyes in the rubber world as the nucleus of a new and rapidly growing rubber manufacturing centre. The production of long-staple cotton of highest quality in Southern California has quickly sprung from infancy to a well recognised commercial success, and if the cactus rubber possibilities materialise, the United States and even California will be able to produce a complete tire from her own raw materials.—"The India Rubber World."

ROOT DISEASE OF CACAO.

Although cacao (or, as the word is usually pronounced here, "cocoa") is not grown in Queensland, except experimentally, we publish the following article on "Root Disease of Cacao" which appeared in the journal of the "Jamaica Agriculture Society" for June and July, 1920, for the benefit of our many readers in tropical countries, especially in Papua, where cacao is planted in several localities.

The article is originally published in the "Bulletin of the Department of Agriculture," Trinidad (April). It is very long and very technical, and only a portion of it can be placed before our readers—viz., the introduction, which is as follows:—

"The death of cacao trees from 'root disease' has been known in the colony (Trinidad) for a long time, but does not appear to have been specially investigated. The cause of death has often been assigned vaguely to 'canker at the root.'

"The root diseases of cacao and limes in some of the West Indian islands have been the subject of research by Mr. W. Nowell, D.I.C., Mycologist on the staff of the Imperial Department of Agriculture for the West Indies. His results are published in a paper 'Rosellinia Root Diseases in the Lesser Antilles,' "West Indian Bulletin" XVI., 1917, 31-71, with twelve illustrations.

"During Mr. Nowell's visit in 1918 to investigate the froghopper blight of sugar-cane, he expressed to me his belief that although rosellinia had not been recorded as a cause of root disease of cacao, &c., in Trinidad and Tobago, it would be found here, considering its wide distribution in the West Indies and Tropical America. Root disease of cacao is not very common in the colony, and as Mr. Nowell had very little time available he had few opportunities for searching for it. A few trees were examined, but without definite result.

"During his second visit in 1919, Mr. Nowell made special investigations in this connection. In one section of a cocoa estate there was found the following comparative results:—

T. Apparently healthy trees	4
S. Sickly trees	3
D. Dead trees	2
— Missing trees	1
T. Young supplies	9
Total	19

"Mr. Nowell examined the trees, &c., and diagnosed the cause of disease as '*Rosellinia Pepó*' which is described in detail later."

* * * * * * * * *

"The disease is not considered a new or introduced one, as it is common in the stumps of all rotten trees; it is, therefore, a serious disease, and, when neglected, it may lead to severe losses. Cocoa trees have been killed by the fungus, and other plants which have been put in for temporary fillers, such plants as dasheens (cocoes), bananas, pigeon pea, cassava, and overlook beans have all been attacked.

"The fungus which causes the disease is found in rotten stumps. It is also common in old plantations of cocoa when the shade trees have been cut out or died, and the stumps have been left. It is particularly virulent in breadfruit and pear trees. Almost everyone here in Jamaica knows of the white fungus commonly found in the roots of dead pear trees. We are not all agreed that this is found on the stumps of breadfruit trees, probably because these do not die out so rapidly as pear trees, and there are, therefore, very few dead stumps of breadfruit trees; at any rate, this fungus does not affect the stumps of breadfruit here, according to our knowledge, as badly as the stumps of pear trees. The disease is also common in lime trees in Dominica, and one lime planter, who has anticipated events, has separated his trees throughout by trenches in both directions, so that each stands in a square plot cut off from the rest, so that if one should be attacked the disease cannot cross through the trenches. These trenches are not made for drainage, but

simply as a protection against the spread of this disease through the soil. We have also seen the white fungus on the roots of coffee trees, which is probably this disease, but as the fungus cannot stand dry conditions or exposure to the sun it is not probably dangerous to the average coffee plantations. It is most common in heavy shade in damp situations. The death of cocoa trees here, often set down to the attack of the grub usually called 'Makaka,' may be really caused by this fungus. This is a matter for observation and inquiry.

"When cocoa trees assume a sickly appearance and the leaves begin yellowing, a search should be made by laying bare the collar and the main roots, and if the white fungus is seen, specimens of the wood might be sent up to the microbiologist here. The disease may spread along some of the roots, or it may get full hold of the collar, and by girdling trees cause very quick death. All dead trees and rotten stumps should be removed from any cocoa cultivation, and no roots should be left in the soil, if possible. Lime should be applied as a disinfectant. No logs should be left standing about, either. There is no cure for infected trees when they are once severely attacked, but, if taken in hand early, the principles of actual treatment are two:—

(*a*) Complete excision of diseased tissues.

(*b*) Exposure as complete as possible of the diseased part and its surroundings to a free circulation of air, with the object of making conditions too dry for the fungus to exist.

"The cases which repay treatment are those arising from surface infection, in which, on inspection, the local nature of infestation appears to be clearly defined. Severed roots should, as far as possible, be removed; cut surfaces should be cleanly trimmed and dressed with paint. Excavations made to get at the seat of injury should be left open. All cut material should be carefully removed and burned. It would be a good practice to dig a trench around each infected tree, and prevent the disease passing through the soil if the treatment is not successful. Disinfection of the soil, in the case of a few infected trees has been tried, and so far has not been successful. Lime has been used, and, in Grenada, iron sulphate. One planter at least has used sulphur, a well known fungus destroyer in other connections. It is safe to say that at the present time there is no disinfectant available which is cheap enough to be used in sufficient quantity to sterilize any considerable area of ground. The lime disinfectant is easy to get and easy to use, and is available, when trees are attacked, to prevent spread of the disease. Then, of course, lime is useful to the soil and to the plants in other directions."

INTERSTATE SPECIAL FRUIT TRAINS.

The fruit special run by the North Coast Fruitgrowers' Association on 7th October carried 167½ tons, of which 97½ tons were for Melbourne, and 70 tons for Sydney. The total comprised 2,664 cases of bananas, 1,633 cases of pines, 20 cases of citrus, 20 cases of papaws, 74 cases of tomatoes, and 69 bags of beans, Melbourne taking 1,823 cases bananas, 674 cases pines, 18 cases citrus, 1 case papaws, and 49 cases tomatoes, and Sydney taking 841 cases bananas, 959 cases pines, 2 cases citrus, 19 cases papaws, 25 cases tomatoes, and 69 bags of beans. District loadings by tonnage was: North Coast to Melbourne 87½ tons, and 36½ tons to Sydney, total 124 tons; Cleveland line to Sydney, 10 cwt.; Currumbin to Melbourne, 10 tons; Tweed Heads to Sydney, 33 tons. District loadings by cases were: North Coast to Melbourne, 1,583 cases of bananas, 674 cases of pines, 18 cases of citrus, 1 case of papaws, and 49 cases of tomatoes; to Sydney, 48 cases of bananas, 952 cases of pines, 2 cases of citrus, 19 cases of papaws, and 69 bags of beans; Cleveland line to Sydney, 7 cases of pines and 25 cases of tomatoes; Currumbin to Melbourne, 240 cases of bananas; and Tweed Heads to Sydney, 793 cases of bananas. Of the North Coast loadings 42½ tons were transhipped at Landsborough, and comprised 903 cases bananas, 161 cases pines, 8 cases citrus, 20 cases of papaws, and 25 bags of beans.

Two fruit specials were run by the North Coast Fruitgrowers' Association, one ex Wallangarra, on 1st October, with North Coast loadings, and one on 2nd October, with North and South Coast loadings. The total weight was 179 tons, of which 85¼ tons went forward to Sydney, and 93¾ tons to Melbourne. The goods comprised 2,074 cases bananas, 2,252 cases pines, 409 cases citrus, 189 cases tomatoes, 33 cases papaws, and 77 bags of beans. Melbourne took 1,349 cases bananas, 708 cases pines, 409 cases citrus, and 189 cases tomatoes; Sydney took 725 cases bananas, 1,544 cases pines, 33 cases papaws, and 77 bags of beans. District loadings, by tonnage were: North Coast to Melbourne, 79¼ tons, to Sydney 56 tons, total 135¼ tons; Currumbin to Melbourne, 14½ tons; Tweed Heads to Sydney, 29¼ tons. Of the North Coast loadings, 38 tons were transhipped at Landsborough, and consisted of 725 cases bananas, 221 cases pines, 18 cases citrus, 33 cases papaws, and 39 bags of beans.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 19.

Burr Buttercup (*Ranunculus muricatus*, L.).

Description.—A rather fleshy, stout, spreading, annual plant. Stems and leaves smooth, quite glabrous or bearing a few week hairs. Leaves fairly large—up to 4 in. across, on stalks of 2 in. in the lower part of the stem—gradually getting much smaller towards the flowers, usually more or less distinctly 3-lobed, the lobes again coarsely toothed; flowers yellow, small (scarcely ½-in. across). Carpels (seeds in the popular sense) 8-16 in the centre of each flower, compressed, when ripe hard, 4-5 lines long, prominently beaked at the apex, and bearing on each face a number of hard, spiny tubercles.

Distribution.—A native of Southern and Eastern Europe (Mediterranean area), North Africa, Western Asia, also occurs in North America, but probably an introduction from Europe. It is a common naturalised weed in temperate Australia. In Queensland, it was first noted about Toowoomba on the Darling Downs, specimens being collected there by Mr. H. A. Longman in September, 1909, and forwarded to the late F. M. Bailey. Since that date it has spread to other localities in the southern parts of the State, but can hardly be classed as a very bad weed.

Common Names.—Burr Buttercup, Rough-seeded Buttercup, Spiny-fruited Buttercup, and Spiny-fruited Crowsfoot are names that have been applied to it.

Remarks.—As a whole, the genus Ranunculus is one of very little economic importance. Some of the species are poisonous, some are very beautiful flowering plants, but most are weeds of moist wet places. There is nothing in particular to record about the present plant; it is not poisonous, but stock do not seem to touch it. There is some danger of the burrs damaging wool if growing in country where sheep are running.

Eradication.—So far as observed in Queensland, it is not a particularly aggressive weed, and calls for no special methods of eradication. It is a moisture-loving plant, and is almost always found in damp, undrained land, the drainage of which ends in its practical eradication.

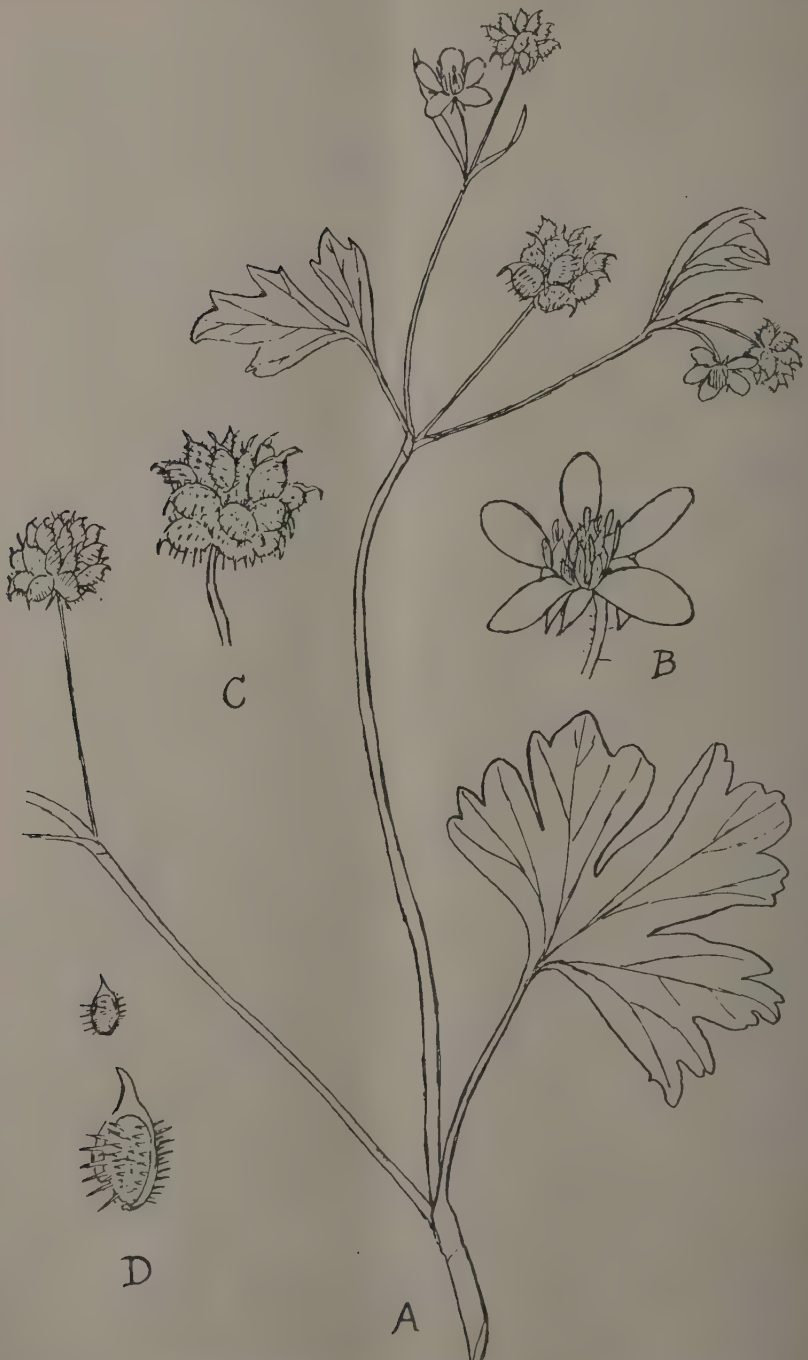

PLATE 20.—BURR BUTTERCUP, OR ROUGH-SEEDED BUTTERCUP (*Ranunculus muricatus*).

A. Shoot, natural size.
B. Flower, enlarged.
C. Head of carpels (seeds), enlarged.
D. A single ripe carpel (seed), natural size and enlarged.

Entomology.

CANE GRUB INVESTIGATIONS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigations, from the Entomologist, Dr. J. F. Illingworth:—

"The weather has been ideal for the growth of sugar-cane—warm days with intermittent light showers. Plant cane has never looked finer, and weeds are held well in check by better methods of cultivation. Hence, conditions are most promising, and with an early rainy season in prospect we are looking forward to a maximum crop again. Fortunately, too, the diseases of the grubs in certain districts are still active, even though the pest has gone deep into the soil to hibernate and pupate. Furthermore, the Digger Wasps are everywhere in evidence in infested fields; so altogether there is hope for a material decrease in the grub pest.

"The Borer Beetle, too, is coming under control, for there is a marked decrease in their depredations in all of the areas where we have liberated the Tachinid parasites (*Ceromasia sphenophori* Vill.) bred at the station.

"The Linear Bugs, on the other hand, have never been so abundant in cane areas. They undoubtedly are coming more and more from the wild grasses, and they certainly are a serious drain upon the sugar-content.

NATURAL ENEMIES OF CANE GRUBS.

"*Digger Wasps.*—It is interesting to record that certain farmers have made use of the advice to plant pigeon peas near cane areas; wherever these occur they are swarming with bees and wasps, which feed upon the nectar. These plants, though rather late in flowering this season, were of considerable value in keeping the wasps in the vicinity of the grubby areas.

"It is well known that the females of these valuable insects are the workers, spending most of their time far beneath the soil in search of their prey. Hence, they only come out when hungry; and their usefulness is greatly increased if they can be supplied with nectar close at hand. In other words, if no flowers are available, the wasps go in search of them, and when fed are apt to seek the nearest grubs in the soil—in blady grass or other wild land, where there is no direct benefit to the canegrower.

"The male wasps, too, feed upon nectar, but they do not enter the soil. They fly about in great numbers just over the surface of grub-infested fields, waiting for the females to emerge from their strenuous duties. Fortunately, the so-called weaker sex is considerably larger among wasps than the indolent males; and, since she is the only one provided with a sting, she is able to lord it over the poor little fellow.

"*Diseases.*—Both the fungus and bacterial diseases continue active in the areas wherever we have discovered them. Unfortunately, these friendly organisms are not generally distributed, though they occur in widely separated localities.

"The bacterial disease is far less virulent than the fungus, under the same conditions. Nevertheless, they often go hand in hand, the grubs dying by a complication of ailments. Often the legs of the grub will become blackened, and one or more will fall off—unmistakable symptoms of the bacterial complaint; then the grub will quickly succumb ot the fungus, his body becoming hard and cheesy, and, finally

turning green as the spores develop. These spores are exceedingly small; even when viewed with a magnification of 400 diameters they appear as tiny oval bodies, and hardly more than one-sixteenth of an inch in length. Ordinarily, unless broken apart, they are attached end to end, like a string of sausages, for these fruiting bodies are formed from the branching tubes of the Mycelium (the vegetative part of the mould). Wherever the Mycelium comes to the surface of the dead grub, it branches profusely, and each of the tips then becomes constricted into a line of numerous spores. Hence the numbers produced by a single grub are unthinkable—a tiny speck of this green powder taken on the point of a pin and placed under the microscope is a revelation, for the mass of spores is beyond counting. Therefore, it is easy to understand how the soil becomes thoroughly inoculated with this contagion as it is ploughed and cultivated. Furthermore, probably a single spore is sufficient to bring about the disease, when ingested with the soil by the grub, if the climatic conditions are right.

BEETLE BORERS AND THEIR PARASITES.

"This terrible pest, second in importance only to the white grubs in Queensland, destroys approximately one ton of sugar per acre, and, where the infestation is severe, considerably more. Furthermore, it is a pest that is rapidly spreading to new districts through the distribution of infested seed-cane. Then, too, where cane from infested districts is hauled long distances to mills, the grubby sticks are dropped along the line, sometimes a whole load spilling in one place. It is noticeable that the fields adjoining such railways have become infested during the past few years. This is particularly the case at Mourilyan, where the cane is sent over from the Goondi side of the river, and also at Hambledon, which brings part of its supply from far up the Babinda line. I have seen the latter cane come into the mill perfectly riddled with the borers, especially following the 1918 cyclone.

"It is very encouraging that the Tachinid parasites are becoming established, for there is a tremendous improvement already noticeable where the flies have been liberated. Undoubtedly the net increase in sugar, due to the checking of this single pest in the Cairns district alone, is sufficient to pay all expenses of our investigation for many years to come.

"I am continuing the breeding of the flies, liberating them in increasing numbers in the vicinity of Gordonvale, until such time as we find them established here.

LINEAR BUGS.

"This new pest (*Phaenacantha australica* Kirkaldy) is still in hoards in many fields, particularly those that are very grassy, and where the headlands are full of grass. Where these insects have been working extensively the leaves show a decided yellowing, many of them being dry and dead at the tips, the fields having an appearance similar to that caused by the leafhoppers in Hawaii before that pest was brought under control.

"It is an easy matter for these hoards of bugs, with their beaks all inserted in the under surface of the leaves, to reduce the sugar content fully a ton or more per acre. Unfortunately, we have not yet had an opportunity to make a careful estimate of this loss here; but it is enlightening to recall the serious depredations caused by leafhoppers in Hawaii, where the cane was so reduced in sugar content by these sucking insects that in many cases it hardly paid for milling. Furthermore, the report of the growers shows most remarkable results from the introduction of the minute egg parasites from the Cairns district. These tiny wasps, so small as to be scarcely visible to the naked eye, multiplied and spread so rapidly that soon after their introduction it was estimated that they saved the industry $1,500,000 annually. It is interesting here to digress, for the same species of leafhopper is found throughout Queensland; and still most growers do not know that these tiny insects exist. They are everywhere present, but in such small numbers that they do no appreciable damage, since they are held completely in control by natural enemies.

"Unfortunately, the Linear Bugs are not so well controlled; and they work so insidiously that it is a difficult matter to get an exact estimation of the damage done by them. If they reduce the sugar a ton per acre in badly infested fields, and this is not improbable, the loss for the whole industry is tremendous. There is no better argument for clean cultivation, at least keeping the grass down within the cane paddocks and along the headlands. Furthermore, it will undoubtedly be found profitable to use fire for their destruction, as often as possible burning the surrounding grass lands, as well as the trash from the cane."

General Notes.

SOCIETIES, SHOW DATES Etc.

Murgon.—Murgon Pastoral, Agricultural, and Horticultural Society. Secretary, T. M. Stephenson.

ERRATUM.

IMPORTS OF COFFEE.

In our issue of October last, owing to the accidental omission of punctuation, the imports of coffee, raw and kiln-dried, into Australia for the year 1917-18 was set down at 257,818 lb. The actual total was 2,605,247 lb., duty being paid on 2,482,480 lb.

HOW TO DESTROY ANTS.

The "South African Gardening and Country Life" for September gives the following simple but effective method of destroying ants in the garden:—

Ants are troublesome in many gardens just now. They have a strong dislike to moisture of any kind, and a very simple remedy is to pour boiling or even cold water from a coarse rose watering can on to their nests. These generally consist of a network of irregular tunnels lying either close to the ground surface or at some distance below it. Sometimes one finds a well organised colony underneath a large stone. All the nests that can be found should be treated in a similar manner and the application repeated in a day or two, when there are evidences of recolonisation. Hot water will kill thousands, and their haunts should be flooded now and again. One ounce of the commercial carbolic acid dissolved in five gallons of water applied as a spray to all places frequented by them is a good poison, and fresh ground lime soon causes them to move on to "fresh fields." If they infest the flower borders, a strong soil fumigant such as vaporite, or plenty of water, will prove effectual. Strong liquid insecticides are also useful to pour into the nests. A good sized bone from the soup pot with some meat attached proves an excellent bait, and can be washed, dried, and used over again.

Answers to Correspondents.

CEMENT FOR FLOOR.

To cement a floor 15 feet wide, 30 feet long, and 4 inches thick, 7 casks or 21 bags of cement will be required. If a topping of cement is required, use one part of sand, one part cement, and lay it to a thickness of ¾ inches; this will take 15 bags more.

CREAM AND BUTTER.

In reply to a correspondent asking for particulars as to the amount of commercial butter that is derived from a quantity of cream containing 40 per cent. of butter-fat, it is estimated that 1 lb. of cream containing that percentage of butter-fat (Babcock method) will produce .48 lb. of commercial butter, and 10 lb. of cream with a similar butter-fat content will produce 4.83 lb. of commercial butter.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER, 1920.

Article.		OCTOBER. Prices.
Bacon	lb.	1s. 5d.
Bran	ton	£9 10s.
Broom Millet	„	£35
Broom Millet (Sydney)	„	£50
Butter (First Grade)	cwt.	238s.
Chaff, Lucerne	ton	£6 10s. to £9 5s.
Chaff, Mixed	„	£6 to £8 13s 4d.
Chaff, Oaten (Imported)	„	£10 5s. to £12
Chaff, Wheaten	„	£8 10s.
Chaff, Panicum	„	£6 to £6 10s.
Cheese	lb.	1s. 2d. to 1s. 2½d.
Flour	ton	£19 10s.
Hams	lb.	1s. 11d to 2s. 2d.
Hay, Lucerne	ton	£5 5s. to £7
Hay, Oaten	„	...
Honey	lb.	8d. to 8½d.
Maize	bush.	7s. 8d. to 7s. 9d.
Oats	„	6s.
Onions	ton	£28
Peanuts	lb.	6d. to 7d.
Pollard	ton	£10
Potatoes (English)	„	£22 6s. 8d. to £24 10s.
Potatoes (Sweet)	cwt.	5s. 3d. to 7s. 6d.
Pumpkins (Cattle)	ton	£4 to £8 14s.
Eggs	doz.	1s. 6½d. to 1s 9½d.
Fowls	per pair	7s. 5d. to 13s.
Ducks, English	„	8s. to 8s. 6d.
Ducks, Muscovy	„	7s. 6d to 10s. 6d.
Geese	„	10s. to 12s. 6d.
Turkeys (Hens)	„	13s 6d. to 18s.
Turkeys (Gobblers)	„	28s. to 40s.
Wheat	bush.	
Turnips (Swede)	cwt.	2s. 6d. to 3s.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	8s. to 14s.
Beans, per sugar bag	4s. to 9s.
Beetroot, per dozen bunches	6d. to 9d.
Broad Beans, per sugar bag	2s. to 3s 6d.
Cabbages, per dozen	1s. to 3s.
Cauliflowers, per dozen	...
Carrots, per dozen bunches	1s. to 2s.
Lettuce, per dozen	2d. to 6d.
Marrows, sack	3s. to 4s.
Peas, per sugar bag	3s. to 10s.
Potatoes (Sweet), per cwt.	5s. to 7s. 6d
Pumpkins (table), per bag	7s. to 11s.
Tomatoes, per quarter case	7s. to 15s.
Turnips (Swede), per doz.	1s. to 1s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	OCTOBER. Prices.
Bananas (Tweed River), per double case	17s. to 26s.
Bananas (Queensland), per double case	25s. to 30s.
Bananas (Fiji), per double case	...
Lemons, per bushel case	3s. to 5s.
Mandarins, per case	20s.
Oranges (common), per bushel case	9s.
Oranges (Navel), per bushel case	15s. to 18s.
Passion Fruit, per bushel case	10s. to 15s.
Pineapples (Queens), per double case	20s. to 23s.
Pineapples (Ripley), per double case	20s. to 22s.
Pineapples (common), per double case	3s. to 8s.
Tomatoes, per quarter case	10s. to 16s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel case	10s. to 16s.
Apples, Cooking, per bushel case	10s. 6d. to 14s. 6d.
Bananas (Cavendish), per dozen	4d. to 11d.
Bananas (Sugar), per dozen	5d. to 9d.
Citrons, per cwt.	16s.
Cocoanuts, per sack	£1 5s.
Cumquats, per quarter case	4s. to 5s. 6d.
Custard Apples, per case	3s. 6d. to 6s.
Gooseberries (Cape), per quart	10d. to 10½d.
Gooseberries, per quart	
Lemons (Lisbon), per quarter case	5s. to 7s. 6d.
Mandarins, per case	7s. to 18s.
Oranges (Seville), per cwt.	16s.
Oranges (Navel), per case	12s. to 15s.
Oranges (other), per case	6s. to 12s.
Papaw Apples, per case	5s. to 9s.
Passion Fruit, per half bushel case	10s. to 19s.
Peaches	
Pineapples (smooth), per dozen	5s. to 7s.
Pineapples (rough), per dozen	8s. 5d. to 10s. 6d.
Strawberries, per dozen boxes	6s. to 15s.
Strawberries, per tray	
Tomatoes, per quarter case	14s. to 17s.

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1920.

Animal.	SEPTEMBER. Prices.
Bullocks	£22 15s. to £28
Cows	£18 15s. to £19 5s.
Merino Wethers	64s. 6d.
Crossbred Wethers	59s.
Merino Ewes	39s.
Crossbred Ewes	49s. 6d.
Lambs	43s.
Pigs (Porkers)	

Subterranean Clover.

THIS wonderful Clover is the most nutritious herbage grown. It grows in dry sandy soil and gravelly pastures, and sows itself when once it gets a start. This can be claimed for no other Clover. Splendid for grazing, very fattening. Cattle may run or graze upon this Trifolium without harming it.

Subterranean Clover has no equal for the general purposes of excellent feed, pertinacity of reproduction, supply of humus, and charging the soil with nitrogen. It is more economical and effective in providing humus and nitrogen to the soil than any other plant known to the Scientific world. Land sown with it will annually produce a crop from its buried seed pods for many years.

Clean Seed, 7/6 lb. ; 7/- lb. in 14 lb. lots or more ;
6/6 lb. in 28 lb. lots or more.

LAW SOMNER
PTY. LTD.,
SEED AND PLANT MERCHANTS *(Established 70 years)*
139-141 SWANSTON STREET, MELBOURNE.

Farm and Garden Notes for December.

Too much care can scarcely be bestowed upon potatoes dug up this month to protect them from the sun. They should be dug or ploughed out as soon as the skin is firm, as they are liable to rot in the ground owing to the great heat.

Field.—The wheat harvest will be now nearing completion. The estimates of the probable yield have varied so considerably that it will be well to wait until the entire harvest is over before speculating on the result. This State is a long way from becoming a wheat-exporting country. The principal factor operating against a still greater extension of the wheatgrowing industry is that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

Given favourable weather, maize, panicum, imphee, kafir corn, and the various millets may be sown.

Cotton sown in October and November will be making headway but slowly, owing to the lack of September and October rains. Keep down all weed growth by scarifying as long as the growth will admit of horse work. Tree cottons, such as Sea Island and Caravonica, should be topped and pruned. In tropical Queensland, cotton may still be sown.

Kitchen Garden.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Sow cabbage and cauliflower seed. Great difficulty will be experienced in getting these to grow at this season, and the plants will consequently be more valuable in proportion. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

Flower Garden.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE SOUTHERN COAST DISTRICTS.

December is somewhat an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry, see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting out of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

THE TROPICAL COAST DISTRICTS.

Clean up all orchards and pineapple and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leaf varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish dumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry, keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit-fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

SEED TESTING.

Samples of any seeds purchased or offered for sale as seeds for sowing may be sent to the Department of Agriculture and Stock for analysis.

WEIGHT OF SAMPLE TO MAIL.

Wheat, Oats, Barley, Maize, Rice, Rye, Peas, Cowpeas, Beans, Tares	8 oz.
Millet, Sorghum, Sudan Grass, Panicum, Buckwheat, Lucerne, Clover, Linseed	4 oz.
Rhodes, Paspalum	2 oz.
Turnip, Cabbage, Parsnip, Carrot, and Vegetable Seeds of like size	½ oz.
All Seeds other than those included above	2 oz.
Vegetable Seeds in made-up packets	3 packets

When drawing a sample be careful to obtain a quantity from the top, bottom, and middle of each bag. These should be thoroughly mixed to ensure the sample being uniform.

The name of the seed, with name and full address of the sender, should be on every sample.

If the result of the test is required for purposes of sale, a fee of 2s. 6d. per sample will be charged.

No charge will be made to Farmers sending in samples of the seed that they have purchased as seed for sowing, providing the following particulars are given:—

Vendor's name and address.

Name of seed.

Quantity purchased.

Date of delivery.

Locality where seed is to be sown.

Name and address of purchaser.

Samples, with covering letter, should be addressed to—

UNDER SECRETARY,
DEPARTMENT OF AGRICULTURE AND STOCK,
BRISBANE.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1920	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·1	5·35	5·29	5·47	4·59	6·5	4·46	6·28
2	6·0	5·35	5·28	5·48	4·58	6·6	4·46	6·29
3	5·59	5·36	5·27	5·49	4·57	6·6	4·46	6·30
4	5·58	5·36	5·26	5·49	4·57	6·7	4·46	6·31
5	5·57	5·37	5·24	5·50	4·56	6·8	4·46	6·32
6	5·56	5·37	5·23	5·50	4·55	6·9	4·46	6·33
7	5·55	5·37	5·22	5·50	4·55	6·9	4·46	6·33
8	5·54	5·37	5·21	5·51	4·54	6·10	4·47	6·34
9	5·53	5·38	5·20	5·51	4·53	6·10	4·47	6·34
10	5·52	5·38	5·19	5·51	4·52	6·11	4·47	6·35
11	5·50	5·38	5·17	5·52	4·52	6·12	4·47	6·35
12	5·49	5·39	5·16	5·52	4·51	6·13	4·48	6·35
13	5·48	5·39	5·15	5·53	4·51	6·14	4·48	6·36
14	5·47	5·40	5·14	5·54	4·50	6·15	4·48	6·37
15	5·46	5·40	5·13	5·55	4·50	6·16	4·49	6·37
16	5·45	5·41	5·12	5·55	4·49	6·17	4·49	6·38
17	5·44	5·41	5·11	5·56	4·49	6·18	4·49	6·38
18	5·43	5·42	5·10	5·56	4·48	6·18	4·50	6·39
19	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·39
20	5·41	5·43	5·8	5·58	4·48	6·20	4·50	6·40
21	5·40	5·43	5·7	5·59	4·48	6·21	4·51	6·40
22	5·39	5·43	5·6	5·59	4·48	6·21	4·51	6·41
23	5·38	5·44	5·5	6·0	4·48	6·22	4·52	6·41
24	5·37	5·44	5·4	6·0	4·47	6·22	4·52	6·42
25	5·36	5·44	5·4	6·1	4·47	6·23	4·53	6·43
26	5·34	5·45	5·3	6·1	4·47	6·24	4·53	6·43
27	5·33	5·45	5·2	6·2	4·47	6·24	4·54	6·44
28	5·32	5·45	5·1	6·2	4·47	6·25	4·54	6·44
29	5·31	5·46	5·0	6·3	4·47	6·26	4·55	6·45
30	5·30	5·46	5·0	6·3	4·47	6·27	4·56	6·45
31	...	...	4·59	6·4	...	...	4·57	6.45

PHASES OF THE MOON, ECLIPSES, &c.

(The times stated are for Queensland New South Wales, and Victoria).

			H.	M.	
6 Sept.	☽	Last Quarter	5	5	a.m.
12 „	●	New Moon	10	52	p.m.
20 „	☾	First Quarter	2	55	p.m.
28 „	○	Full Moon	11	57	a.m.

Perigee on 9th at 8·12 a.m. Apogee on 21st at 8·42 a.m.

5 Oct.	☽	Last Quarter	10	54	a.m.
12 „	●	New Moon	10	50	a.m.
20 „	☾	First Quarter	10	30	a.m.
28 „	○	Full Moon	12	9	a.m.

Perigee on 4th at 7·54 p.m. and 31st at 12·26 a.m. Apogee on 19th at 4·42 a.m. A Total Eclipse of the Moon will occur on the night of the 27th, commencing about 11 30. An hour earlier it will be entering the dark shadow of the earth.

3 Nov.	☽	Last Quarter	5	35	p.m.
11 „	●	New Moon	2	5	a.m.
19 „	☾	First Quarter	6	13	a.m.
26 „	○	Full Moon	11	42	a.m.

Apogee on 16th at 12·18 a.m. Perigee on 27th at midnight. The Moon will cause a partial eclipse of the Sun during the night of the 10th, visible only on the other side of the world, including Great Britain and Ireland.

3 Dec.	☽	Last Quarter	2	29	a.m.
10 „	●	New Moon	8	4	p.m.
19 „	☾	First Quarter	12	40	a.m.
25 „	○	Full Moon	10	39	p.m.

Apogee on 13th at 3·30 p.m. Perigee on 26th at 10·24 a.m.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise about 4 minutes later than at Brisbane if it were not for its higher elevation, and at Oontoo (longitude 141 degrees E.) about 48 minutes later.

At St. George, Cunnamulla, and Thargomindah the times of sunrise and sunset will be about 18 m., 30 m., and 38 minutes respectively, later than at Brisbane.

At Roma the times of sunrise and sunset may be roughly arrived at by adding 16 minutes to those given for Brisbane, but an allowance of 3 or 4 minutes more is sometimes necessary.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1920 AND 1919, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1920.	Sept., 1919.		Sept.	No. of Years' Records.	Sept., 1920.	Sept., 1919.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·60	19	0·21	0·83					
Cairns	1·69	38	1·03	1·56	Nambour	2·48	24	2·57	0·15
Cardwell	1·43	48	2·52	1·03	Nanango	1·95	38	2·47	0·29
Cooktown	0·57	44	0·91	0·47	Rockhampton ...	1·33	33	0·66	0·03
Herberton	0·48	33	0·23	0·92	Woodford	2·14	33	2·48	0·18
Ingham	1 06	28	2 99	0·95					
Innisfail	3·04	39	2·49	2·86					
Mossman	1·08	12	2 04	2 01	*Darling Downs.*				
Townsville	0·76	49	1·89	0·11					
					Dalby	1·79	50	2·34	0·15
					Emu Vale	1·90	24	2·06	0·12
Central Coast.					Jimbour	1·65	32	1·65	Nil
					Miles	1·46	35	2·67	0·03
Ayr	1·59	33	0·91	0·05	Stanthorpe ...	2 46	47	2·99	0·18
Bowen	0 83	49	1·07	0·03	Toowoomba ...	2·24	48	2·40	0·41
Charters Towers ...	0·80	38	0 66	0·04	Warwick	1·91	33	2·29	0·16
Mackay	1·49	49	1 20	0 18					
Proserpine	1·95	17	2·93	0·12					
St. Lawrence ...	1·33	49	0·93	0·07	*Maranoa.*				
South Coast.					Roma	1·58	46	2·64	Nil
Biggenden	1·68	21	0·02	2·61					
Bundaberg	1·84	37	1·94	Nil	*State Farms, &c.*				
Brisbane	2·08	69	3·43	0·19					
Childers	1·98	25	3·21	Nil	Bungeworgorai ...	1·55	6	1·75	Nil
Crohamhurst ...	2·53	25	3·71	0·33	Gatton College ...	1·72	21	2·54	0·12
Esk	2 32	33	3·24	0·23	Gindie	0·88	21	1·32	Nil
Gayndah	1·58	49	2·67	0·06	Hermitage ...	1·62	14	2·51	0·12
Gympie	2·15	50	2·82	0·05	Kairi	0·88	6	0.24	0·91
Glasshouse M'tains	2 02	12	2·77	0·15	Sugar Experiment Station, Mackay	1·33	23	1·20	0·08
Kilkivan	1·73	41	1·86	Nil	Warren	0·81	6	0·40	Nil
Maryborough ...	1·97	49	2·52	Nil					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year, and for the same period of 1919, having been compiled from telegraphic reports, are subject to revision.

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